

# Opasraportti

## FBMM - Biochemistry (2020 - 2021)

University's new study guide for academic year 2020-2021 is published at <https://opas.peppi oulu.fi>.

The study guide includes information on degrees, curriculums, courses and course timetables. Course registrations are still done in Oodi.

If you have questions on information in the study guide, please contact the study field's Academic Affairs Service Team <https://www oulu.fi/forstudents/faculty-study-affairs>.

### Biochemistry 2020-2021

Biochemistry is the study of life at the molecular level. Based on underlying chemical principles biochemists study the details of biological systems at both macro- and micro-scales in whole organisms, in cells, in the test tube and by structural and computational based analysis. Even the simplest living systems are extremely complicated, and comprise of a vast array of interconnecting processes. These processes are governed by our genes, the genetic code which makes us who and what we are. Genes are not everything though; the information encoded within them is converted into proteins and it is proteins that are the primary workers in the cell, playing fundamental roles in all aspects of biochemistry. Smaller molecules also play a key role, both through the complex cycles of metabolism, generating energy and essential cellular precursors from nutrients taken from the external milieu and by playing a role in modulating the function of genes and of proteins.

Sometimes cellular processes go wrong, due to genetic mutations or external environmental factors or by chance events, and then diseases such as cancer, diabetes, cystic fibrosis or Alzheimer's may arise. Only by understanding both the details of the underlying mechanisms of cellular action and the complex interplay of 20,000 genes, a million different proteins and thousands of metabolites can these diseases be understood and effective treatments generated. These treatments may be small molecules, designed both to be targeted to the appropriate site within the body and to inhibit or enable a specific cellular process through rational drug design, or they may be macromolecules, such as proteins produced on an industrial scale by the biotech industry, or there is the growing area of gene therapy, replacing a loss of function by introducing a working gene.

All of this, the understanding of the mechanisms of cellular action at the molecular level along with the rational design and production of therapeutic treatments, is the work of the biochemist.

## Education

The education of biochemists consists of a 3-year Bachelor's degree (BSc, Bachelor of Science) and a 2-year Master's degree (MSc, Master of Science). This two-stage degree structure harmonizes degrees in biochemistry in different universities, shortens graduation times, facilitates transfer of students between universities in different EU countries, and produces a biochemist's professional skills that are recognized internationally.

Teaching in the Bachelor's degree is partly in Finnish, partly in English, and takes place both at the Linnanmaa campus and at the Kontinkangas campus (a whole day at either campus). Exchange studies at any of our regular exchange partner universities, e.g. in Germany, Austria or England, are popular. There is a period free of compulsory courses during the third study year, which makes it possible to go to exchange without delaying of graduation.

Studying in the Master's programme is in English. Both study lines - Protein Science and Biotechnology, and Molecular Medicine - also run as international programs for foreign students. In Molecular Medicine there is also a double degree program with Ulm University (Germany) applicable also by Finnish students (5 places/year).

According to the mission of the Faculty of Biochemistry and Molecular Medicine, timely and high-quality teaching is research-based and stems from our strong basic research: all researchers teach and all teachers do research. Biochemistry is a field that calls for innovative specialists. Teaching is thus seen as an entity where high quality basic and doctoral education, including post-doctoral training abroad, is a fundamental part of the faculty structure.

Post graduate training has an important role in the faculty: research work aiming at doctoral dissertation is the first job of many biochemists. Those with a research career in mind often continue their Master's thesis (pro gradu) project to a PhD thesis or begin one straight after graduation. Many research groups of international level are operating in the faculty and about 50 PhD students are working here at present. Post-graduate training is rationally planned and is executed in the form of clear-cut research projects.

Most of the students who have graduated from the degree program in biochemistry, University of Oulu, are working in universities within research and teaching, while some are employed by industry, business or other institutes for tasks in research, education, development, communication or management. One fifth have obtained the PhD degree, with most having also spent a post-doctoral period abroad.

## Studies

Education Designer Jari Heikkinen helps in matters related to studies. In questions concerning a single study module student can contact the responsible person of the course.

All courses and exams organized by faculty must be subscribed to via WebOodi (<https://weboodi oulu.fi/oodi>) before the relevant deadline.

The recommended order for courses for a bachelor degree is presented in the figure. For many biochemistry courses there are some previous courses required as a prerequisite.

As a part of the studies in biochemistry, a student will use literature and/or results from course experiments to make many kinds of written exercises (reports, Pro gradu etc.) and presentations. A report cannot be a copy of the other text and all citations from other texts or figures must be clearly presented as references. Copying, using of the text of other students and other forms of plagiarism are forbidden and will lead to punishment and rejection of the report.

### Recommended timing for B.Sc. courses in Biochemistry

Yr3 autumn	Yr3 spring
BIOCHEMISTRY	BIOCHEMISTRY
Cellular communication	Maturity test

<p>Bachelor's thesis</p> <p>Final examination</p> <p><b>EXTENSION SCHOOL</b></p> <p>Swedish, written skills</p> <p>Swedish, oral skills</p> <p><b>Optional courses</b></p> <p><b>CHEMISTRY</b></p> <p>Laboratory course in organic chemistry I *</p> <p><b>SCIENCE AND TECHNOLOGY LIBRARY TELLUS</b></p> <p>Introduction to information retrieval*</p>	<p>Virology*</p> <p>Final examination</p> <p>Introduction to immunology</p> <p><b>Optional courses</b></p> <p><b>BIOLOGY</b></p> <p>Developmental biology-histology*</p> <p><b>LABORATORY ANIMAL CENTRE</b></p> <p>Using animals in research - carrying out procedures *</p>
<b>Yr2 autumn</b>	<b>Yr2 spring</b>
<p><b>BIOCHEMISTRY</b></p> <p>Molecular biology I</p> <p>Metabolism II</p> <p>Protein Chemistry I</p> <p><b>CHEMISTRY</b></p> <p>Organic chemistry I *</p> <p>Introduction to analytical chemistry *</p>	<p><b>BIOCHEMISTRY</b></p> <p>Physical biochemistry</p> <p>Cellular biology</p> <p>Physiological biochemistry</p> <p><b>BIOLOGY</b></p> <p>Concepts of genetics for biochemists</p> <p><b>MATHEMATICAL SCIENCES</b></p> <p>Introduction to statistics</p> <p>A second course in statistics</p>
<b>Yr1 autumn</b>	<b>Yr1 spring</b>
<p><b>BIOCHEMISTRY</b></p> <p>Orientation</p> <p>Biochemical methodologies I</p> <p>Biomolecules for biochemists</p> <p><b>EXTENSION SCHOOL</b></p>	<p><b>BIOCHEMISTRY</b></p> <p>Biochemical methodologies I</p> <p>Metabolism I</p> <p>Microbiology</p> <p><b>EXTENSION SCHOOL</b></p>

English for biochemists I	English for biochemists I
<b>BIOLOGY</b>	
Introduction to cell biology and physiology	
<b>CHEMISTRY</b>	
General and inorganic chemistry A	<b>CHEMISTRY</b>
General and inorganic chemistry B	Introduction to organic chemistry
Introductory laboratory course in chemistry	

\* Recommended optional studies

## Biochemistry as a minor subject

Biochemistry courses can be attended freely by students from degree programmes with only one restriction: We reserve right to not allow students on the course if the work places available in the laboratory or equipment available are insufficient. Also for laboratory exercises the student must have sufficient prior practical experience.

All courses and exams organized by faculty must be subscribed to via WebOodi (<https://weboodi oulu.fi/oodi>) before the relevant deadline.

A record of biochemistry as a minor subject will be given when the amount of accepted studies is at least 15 credits.

## Examinations and grades

The time and place of examinations are informed via timetables in the home page of faculty. Students must subscribe to exams via WebOodi (<https://weboodi oulu.fi/oodi>) before the relevant deadline. The grading scale is 0-5. The lowest passing grade is 1. Some courses are graded pass/fail. Three final exams are organized for each course. A course must be passed during the given time, not in another study year.

The final grade for Bachelor and Master degree in biochemistry and for biochemistry as a minor subject will be calculated as follows: the Grades of graded courses are multiplied by the number of credits. The final grade is the sum of products divided by the total number of credits.

Final grades will be determined as follows:

1/5	Sufficient	1,00 – 1,49
2/5	Satisfactory	1,50 – 2,49

3/5	Good	2,50 – 3,49
4/5	Very Good	3,50 – 4,49
5/5	Excellent	4,50 – 5,00

The final grade will be given by secretary of student affairs.

## Lines and degrees

Faculty of biochemistry and molecular medicine offers one bachelors level degree, **Biochemistry** and two masters level degrees, **Protein Science and Biotechnology** and **Molecular medicine**.

- 1) **Biochemistry**. B.Sc. Degree In Finnish and in English
- 2) **Protein Science and Biotechnology**. M.Sc. Degree entirely in English.
- 3) **Molecular medicine**. M.Sc. Degree entirely in English.

In addition, the Faculty of biochemistry and molecular medicine offers a Master's Degree Programme for Finnish and international students, who have obtained their Bachelor's degree from other institute.

Faculty of Biochemistry and Molecular biology offers Molecular Medicine, double degree, Master's Programme in Biochemistry, Master of Science program together with University of Ulm, Germany. Maximum of five students will be selected.

## Bachelor of Science (Biochemistry)

Education leading to a Bachelor's degree in biochemistry provides the student with:

- apply fundamental knowledge in biochemistry and ancillary subjects and follow and evaluate developments in that field;
- apply scientific thinking and to use scientific methods;
- relate to and discuss the high public awareness and impact on society of biochemistry;
- complete responsible and goal-oriented teamwork and in individual work;
- capability to apply the acquired knowledge in working life;
- communicate in Finnish and Swedish as stipulated in the Degree Statute, as well as proficiency in English;
- demonstrate transferable and cognitive skills, including the ability to communicate effectively.

The credit requirement for the lower university degree of Bachelor of Science (Biochemistry) is 180. Studies are organized such that students can complete the degree within three years of full-time study. There is an option for a BSc Degree in biochemistry with international exchange. This includes additional appropriate compulsory language studies to allow integration of the student into the host environment during student exchange period. Student is free to select either of the BSc Degrees and may freely switch between degrees.

Obligatory course units at the beginning of studies are common to all students, but students also select course units specific to their longer-term goals.

A Bachelor's degree consists of the following elements:

<b>B.Sc. Degree in biochemistry</b>	
General studies	8 credits
Basic studies in Biochemistry	30 credits
Intermediate studies in Biochemistry	61 credits
Maturity test	0 credits
Chemistry	20 credits
Biology	8 credits
Statistics	10 credits
Optional studies*	43 credits
<b>Total at least</b>	<b>180 credits</b>

\* BSc studies must include a minor subject that comprises at least 25op of basic / intermediate studies

A Bachelor's degree with international exchange consists of the following elements:

<b>B.Sc. Degree in Biochemistry with international exchange</b>	
General studies	8 credits
Basic studies in Biochemistry	30 credits
Intermediate studies in Biochemistry	61 credits
Maturity test	0 credits
Chemistry	20 credits
Biology	8 credits
Statistics	10 credits
Appropriate language studies	up to 10 credits
Biochemical studies in the host university	12-30 credits
Other optional studies*	3-31 credits
<b>Total at least</b>	<b>180 credits</b>

\* BSc studies must include a minor subject that comprises at least 25op of basic / intermediate studies

# Master of Science (Protein Science and Biotechnology; Molecular medicine)

Education leading to a Master's degree in Protein Science and Biotechnology or Molecular medicine provides the student with:

- apply scientific knowledge and methods to topical tasks and to undertake scientific research with supervision;
- analyze information and data and their setting within a theoretical network accompanied by critical analysis and assessment;
- integrate the subject area as a coherent whole;
- communicate with good language skills for national and international tasks;
- demonstrate transferable and cognitive skills, including the ability to communicate effectively and critically about science using a variety of approaches;
- apply further knowledge, including the abilities to conceive, design and implement independent research and
- demonstrate capability for scientific postgraduate work.

A Master degree consists of the following elements:

<b>M.Sc. Degree</b>	
Obligatory advanced courses	50-60 credits
Maturity test	0 credits
Optional studies	60-70 credits
<b>Total at least</b>	<b>120 credits</b>

## STUDIES FOR B.Sc. DEGREE

<b>General studies 8 credits</b>	<b>credits</b>	<b>Semester</b>	<b>Unit</b>
Orientation (740076Y)	2	Autumn yr 1- Spring yr1	<i>FBMM</i>
English for biochemists I (902100Y)	3	Autumn yr 1-Spring yr 1	<i>Extension school</i>
Second official language (Swedish), written skills (901050Y)	1	Autumn yr 3	<i>Extension school</i>
Second official language (Swedish), oral skills (901051Y)	2	Autumn yr 3	<i>Extension school</i>
<b>Basic studies in biochemistry 30 credits</b>			<b><i>FBMM</i></b>
Biomolecules for biochemists (740143P)	8	Autumn yr 1	
Biochemical methodologies I (740151P)	10	Autumn yr 1-Spring yr 1	

Metabolism I (740146P)	6	Spring yr 1	
Physical biochemistry (740145P)	6	Spring yr 2	
<b>Intermediate studies in biochemistry 61 credits</b>			<b><i>FBMM</i></b>
Molecular biology I (740361A)	8	Autumn yr 2	
Microbiology (740363A)	6	Spring yr 1	
Protein chemistry I (740364A)	8	Autumn yr 2	
Cellular biology (740362A)	6	Spring yr 2	
Metabolism II (740367A)	6	Autumn yr 2	
Physiological biochemistry (740386A)	5	Spring yr 2	
Bachelor's Thesis (740376A)	10	Autumn yr 3	
Cellular communication (740366A)	6	Autumn yr 3	
Maturity test (740377A)	0	Spring yr 3	
Final examination (740372A)	6	Autumn yr3-Spring yr 3	
<b>Chemistry 20 credits</b>			<b><i>Chemistry</i></b>
General and inorganic chemistry A (780117P)	5	Autumn yr 1	
General and inorganic chemistry B (780118P)	5	Autumn yr 1	
Introductory laboratory course in chemistry (780123P)	5	Autumn yr 1	
Introduction to organic chemistry (780116P)	5	Spring yr 1	
<b>Biology 8 op</b>			<b><i>Biology</i></b>
Introduction to cell biology and physiology (750122P)	5	Autumn yr 1	
Concepts of genetics for biochemists (753122P)	3	Spring yr 2	
<b>Statistics 10 op</b>			<b><i>Mathematics</i></b>
Introduction to statistics (806118P)	5	Spring yr 2	
A second course in statistics (806119P)	5	Spring yr 2	
<b>Recommended optional studies</b>			
Organic chemistry I (780305A)	5	Autumn yr 2	<i>Chemistry</i>
Introduction to analytical chemistry (780119P)	5	Autumn yr 2	<i>Chemistry</i>
Introduction to information retrieval (030005P)	1	Autumn yr 3	<i>Tellus</i>
Laboratory course in organic chemistry I (780307A)	5	Autumn yr 3	<i>Chemistry</i>



Introduction to immunology (740384A)	5	Spring yr 3	<i>FBMM</i>
Virology (740385A)	5	Spring yr 3	<i>FBMM</i>
Developmental biology-histology (751320A)	5	Spring yr 3	<i>Biology</i>
Using animals in research - carrying out procedures (040911S) <i>probably this course is not organized every year in English</i>	3	Spring yr 3	<i>Laboratory Animal Centre</i>
Tutoring / confidential posts (740074Y)	1.5	Year 1-3	<i>FBMM</i>
<b>Other optional studies</b>			
Orientation to research work (740383A)/Orientation to biochemical work (740382A)	0-6	Year 1-3	<i>FBMM</i>
Biochemical and biomedical Innovation (740381A)	2-5	Year 1-3	<i>FBMM</i>
Activities in University and Student Organizations (740079Y)	1-10	Year 1-3	<i>FBMM</i>
Practical teaching for biochemists (740075Y)			<i>FBMM</i>
Working life course (740078Y)	6	Year 1-3	<i>FBMM</i>
<b>Minor in Introduction to business studies</b>			<i>OBS</i>
Management and Organizations (OPEN UNI) ( <a href="#">ay724102P</a> )	5	Year 1-3	
Management Accounting (OPEN UNI) ( <a href="#">ay724105P</a> )	5	Year 1-3	
Financial Markets (OPEN UNI) ( <a href="#">ay724108P</a> )	5	Year 1-3	
Finnish Economy and Economic Policy (OPEN UNI) ( <a href="#">ay724111P</a> )	5	Year 1-3	
Introductory Economics (OPEN UNI) ( <a href="#">ay724110P</a> )	5	Year 1-3	
<b>Minor in Industrial engineering and management</b>		<i>Year 1-3</i>	<i>IEM</i>
Basics of industrial engineering and management ( <a href="#">555225P</a> )	5	Year 1-3	
Project management ( <a href="#">555285A</a> )	5	Year 1-3	
Product development ( <a href="#">555242A</a> )	5	Year 1-3	
Managing well-being and quality of working life ( <a href="#">555264P</a> )	5	Year 1-3	
Process and quality management ( <a href="#">555286A</a> )	5	Year 1-3	
<b>Minor in Entrepreneurship</b>		<i>Year 1-3</i>	<i>OBS</i>
Entrepreneuring for Tomorrow ( <a href="#">724811A</a> )	5	Year 1-3	

Building Change Through Entrepreneurship ( <a href="#">724812A</a> )	5	Year 1-3
Entrepreneurship in Action ( <a href="#">724813A</a> )	5	Year 1-3
Introduction to Business Development ( <a href="#">724814A</a> )	5	Year 1-3
Entrepreneurial Assignment ( <a href="#">724815A</a> )	5	Year 1-3
Building Business Through Creativity and Collaboration ( <a href="#">724816A</a> )	5	Year 1-3

## Optional courses at any universities

Other suitable courses taught at any university will be accepted as optional studies. The content of the courses must not be too similar to other courses which have counted towards BSc degree. In all cases Education Designer Jari Heikkinen should be contacted to confirm acceptance/suitability. We would advice this done before the course is taken, especially in the case of courses taken from universities outside Finland

# Optional studies

BSc degree in biochemistry includes 43 credits of optional studies. Recommended optional courses are put together in the time table so that they do not clash with obligatory courses. However, students are free to select other university courses either in Finland or abroad. The content of courses must not be too similar to obligatory courses. Courses taken outside University of Oulu should be agreed with Education Designer Jari Heikkinen in advance. BSc studies must include a minor subject that comprises at least 25op of basic / intermediate studies. The minor subject can be in any subject, but students are advised that the compulsory studies in either chemistry or biology can be included in the 25op. Suggested minor subjects include: Chemistry, Biology, Business studies, Industrial engineering and management, Entrepreneurship and Internalization. An internationalization minor is obtained from exchange studies in the host university and appropriate language studies.

## STUDIES FOR B.Sc. DEGREE WITH INTERNATIONAL EXCHANGE

General studies 8 credits	credits	Semester	Unit
Orientation (740076Y)	2	Autumn yr 1- Spring yr1	<i>FBMM</i>
English for biochemists I (902100Y)	3	Autumn yr 1-Spring yr1	<i>Extension school</i>
Second official language (Swedish), written skills (901050Y)	1	Autumn yr 3	<i>Extension school</i>
Second official language (Swedish), oral skills (901051Y)	2	Autumn yr 3	<i>Extension school</i>
<b>Basic studies in biochemistry 30 credits</b>			<b><i>FBMM</i></b>
Biomolecules for biochemists (740143P)	8	Autumn yr 1-Spring yr1	

Biochemical methodologies I (740151P)	10	Autumn yr 1-Spring yr 1	
Metabolism I (740146P)	6	Spring yr 1	
Physical biochemistry (740145P)	6	Spring yr 2	
<b>Intermediate studies in biochemistry 61 credits</b>			<b>FBMM</b>
Microbiology (740363A)	6	Spring yr 1	
Molecular biology I (740361A)	8	Autumn yr 2	
Protein chemistry I (740364A)	8	Autumn yr 2	
Metabolism II (740367A)	6	Autumn yr 2	
Cellular biology (740362A)	6	Spring yr 2	
Physiological biochemistry (740386A)	5	Spring yr 2	
Bachelor's Thesis (740376A)	10	Autumn yr 3	
Cellular communication (740366A)	6	Autumn yr 3	
Maturity test (740377A)	0	Autumn yr 3	
Final examination (740372A)	6	Autumn yr3-Spring yr 3	
<b>Chemistry 20 credits</b>			<b>Chemistry</b>
General and inorganic chemistry I (780117P)	5	Autumn yr 1	
General and inorganic chemistry II (780118P)	5	Autumn yr 1	
Introductory laboratory course in chemistry (780123P)	5	Autumn yr 1	
Introduction to organic chemistry (780116P)	5	Spring yr 1	
<b>Biology 8 credits</b>			
Introduction to cell biology and physiology (750122P)	5	Autumn yr 1	<i>Biology</i>
Concepts of genetics for biochemists (753122P)	3	Spring yr 2	<i>Biology</i>
<b>Statistics 10 credits</b>			
Introduction to statistics (806118P)	5	Spring yr 2	<i>Mathematics</i>

A second course in statistics (806119P)	5	Spring yr 2	<i>Mathematics</i>
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<b>Biochemical studies in the host university 12-30 credits</b>		Spring yr3	<i>Host university</i>
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### Recommended optional studies

Organic chemistry I (780305A)	5	Autumn yr 2	<i>Chemistry</i>
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Introduction to analytical chemistry (780119P)	5	Autumn yr 2	<i>Chemistry</i>
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Introduction to information retrieval (030005P)	1	Autumn yr 3	<i>Tellus</i>
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Laboratory course in organic chemistry I (780307A)	5	Autumn yr 3	<i>Chemistry</i>
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Tutoring / confidential posts (740074Y)	1,5	Year 2-3	<i>FBMM</i>
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### Other optional studies

Orientation to research work (740383A)/Orientation to biochemical work (740382A)	0-6	Year 1-3	<i>FBMM</i>
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Biochemical and biomedical Innovation (740381A)	2-5	Year 1-3	<i>FBMM</i>
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Activities in University and Student Organizations (740079Y)	1-10	Year 1-3	<i>FBMM</i>
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Working life course (740078Y)	6	Year 1-3	
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### Minor in Introduction to business studies **OBS**

Management and Organizations (OPEN UNI) ( <a href="#">ay724102P</a> )	5	Year 1-3	
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Management Accounting (OPEN UNI) ( <a href="#">ay724105P</a> )	5	Year 1-3	
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Financial Markets (OPEN UNI) ( <a href="#">ay724108P</a> )	5	Year 1-3	
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Finnish Economy and Economic Policy (OPEN UNI) ( <a href="#">ay724111P</a> )	5	Year 1-3	
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Introductory Economics (OPEN UNI) ( <a href="#">ay724110P</a> )	5	Year 1-3	
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<b>Minor in Industrial engineering and management</b>		<b>Year 1-3</b>	<b>IEM</b>
Basics of industrial engineering and management ( <a href="#">555225P</a> )	5	Year 1-3	
Project management ( <a href="#">555285A</a> )	5	Year 1-3	
Product development ( <a href="#">555242A</a> )	5	Year 1-3	
Managing well-being and quality of working life ( <a href="#">555264P</a> )	5	Year 1-3	
Process and quality management ( <a href="#">555286A</a> )	5	Year 1-3	
<b>Minor in Entrepreneurship</b>	<b>5</b>	<b>Year 1-3</b>	<b>OBS</b>
Entrepreneuring for Tomorrow ( <a href="#">724811A</a> )	5	Year 1-3	
Building Change Through Entrepreneurship ( <a href="#">724812A</a> )	5	Year 1-3	
Entrepreneurship in Action ( <a href="#">724813A</a> )	5	Year 1-3	
Introduction to Business Development ( <a href="#">724814A</a> )	5	Year 1-3	
Entrepreneurial Assignment ( <a href="#">724815A</a> )	5	Year 1-3	
Building Business Through Creativity and Collaboration ( <a href="#">724816A</a> )	5	Year 1-3	

## Appropriate language studies

Appropriate language studies (up to 10 credits) should be taken prior the exchange period. The courses can be selected from repertoire of Language and Communication and/or Open university. Autumn yr2-autumn yr3 is the ideal period for these studies. The language courses given by the host university at the beginning of exchange period will be accepted too.

## Optional studies

BSc degree in biochemistry with international exchange includes 43 credits of optional studies. A minimum of 12 credits of these must be passed in host university during exchange period (biochemistry courses). Recommended optional courses at University of Oulu are put together in the timetable so that they do not clash with obligatory courses. However, students are free to select

other university courses either in Finland or abroad. The content of courses must not be too similar to obligatory courses. Courses taken outside University of Oulu should be agreed with Education designer Jari Heikkinen in advance. BSc studies must include a minor subject that comprises at least 25op of basic / intermediate studies. Students are advised to do the minor subject in either chemistry or biology (compulsory studies in these subjects can be included in the 25op total).

#### Courses for minor subject students

	credits	semester
Biomolecules (740148P)	5	Autumn-Spring
Biomolecules for Bioscientists (740147P)	8	Autumn-Spring
Metabolism I (740149P)	4	Spring
Microbiology (740374A)	3	Spring
Molecular biology I (740373A)	4	Autumn
Biochemical methodologies I (740144P)	8	Autumn-Spring

## STUDIES FOR M.Sc.DEGREE

In addition to compulsory and optional specialist courses (minimum 3 courses) student must select other courses listed in any MSc line) or any other suitable courses for minimum 120 credits according to student's career aspirations. Student is free to take courses from both lines and decide later according to subject of Pro Gradu work which MSc line to graduate in.

### Protein Science and Biotechnology (120 credits)

Compulsory courses	credits	Semester
Protein chemistry II* (744626S)	5	Autumn yr1
Molecular biology II* (744627S)	5	Autumn yr1
Protein production and analysis* (747618S)	10	autumn yr1
Biochemical methodologies II (747616S)	10	Autumn yr1
Orientation to research work (744628S) / Orientation to biochemical work (744629S)	10-20	Autumn yr 1-Spring yr 1
MSc thesis (Pro gradu) (744691S)	30	
MSc thesis, additional experimental work (in 5 ECTS blocks ) (744692S)	0-30	
Maturity test (M.Sc. degree) (740672S)	0	
<b>Optional specialist courses (a minimum of 3 of these courses must be taken)</b>		
In silico methodologies in biochemistry and molecular medicine (747613S)	5	Spring
Introduction to big data analysis and bioinformatics models (744634S)	5	Spring

Biochemistry and biotechnology of protein folding (747617S)	5	Spring
Macromolecular X-ray crystallography (747614S)	5	Autumn
Introduction to structure-based drug discovery (747615S)	5	Spring
<b>Other optional courses</b>		
Dissertation (744631S)	15	
Scientific communication for biochemists ( 902154Y)	5	Spring yr1
Scientific presentation (744625S)	1-2	
Final examination in protein science and biotechnology (747694S)	10	
Yeast genetics (744632S)	5	Spring
Biochemical and biomedical Innovation (740381A)	2-5	yr1-yr2
Advanced information skills (300002M, Science and Technology library Tellus)	1	
Bioreactor technology (488321S, Bioprocess Engineering)	5	Autumn
Advanced course for biotechnology (488305S, Bioprocess Engineering)	5	Spring
Using animals in research - carrying out procedures (040911S, Laboratory Animal Centre)**	3	spring
<b>Minor in Introduction to business studies</b>		<b>OBS</b>
Management and Organizations (OPEN UNI) ( <a href="#">ay724102P</a> )	5	yr1-yr2
Management Accounting (OPEN UNI) ( <a href="#">ay724105P</a> )	5	yr1-yr2
Financial Markets (OPEN UNI) ( <a href="#">ay724108P</a> )	5	yr1-yr2
Finnish Economy and Economic Policy (OPEN UNI) ( <a href="#">ay724111P</a> )	5	yr1-yr2
Introductory Economics (OPEN UNI) ( <a href="#">ay724110P</a> )	5	yr1-yr2
<b>Minor in Industrial engineering and management</b>		<b>IEM</b>
Basics of industrial engineering and management ( <a href="#">555225P</a> )	5	yr1-yr2
Project management ( <a href="#">555285A</a> )	5	yr1-yr2
Product development ( <a href="#">555242A</a> )	5	yr1-yr2
Managing well-being and quality of working life ( <a href="#">555264P</a> )	5	yr1-yr2
Process and quality management ( <a href="#">555286A</a> )	5	yr1-yr2
<b>Minor in Entrepreneurship</b>	<b>5</b>	<b>OBS</b>
Entrepreneuring for Tomorrow ( <a href="#">724811A</a> )	5	yr1-yr2

Building Change Through Entrepreneurship ( <a href="#">724812A</a> )	5	yr1-yr2
Entrepreneurship in Action ( <a href="#">724813A</a> )	5	
Introduction to Business Development ( <a href="#">724814A</a> )	5	yr1-yr2
Entrepreneurial Assignment ( <a href="#">724815A</a> )	5	yr1-yr2
Building Business Through Creativity and Collaboration ( <a href="#">724816A</a> )	5	yr1-yr2

\*Compulsory courses: either Protein chemistry II and Molecular biology II together (10 ECTS) or Protein production and analysis (10 ECTS) (only for students that have not attended Protein chemistry I).

\*\*probably this course is not organized every year in English

### Optional courses at any universities

Other suitable courses taught at any university (for minimum 120 credits of MSc Degree) will be accepted as optional studies. Courses given in research units eg. Biocenter Oulu will be accepted. Courses must be connected to biochemistry or logically support some aspect of it and they will have to be at an appropriate level. The content of the courses must not be too similar to other courses which have counted towards the students BSc degree or towards their MSc. In all cases Education Designer Jari Heikkinen should be contacted to confirm acceptance / suitability. We would advise that this is done before the course is taken, especially in the case of courses taken from universities outside Finland.

### Molecular medicine (120 credits)

Obligatory courses	credits	Semester
Protein chemistry II* (744626S)	5	Autumn yr1
Molecular biology II* (744627S)	5	Autumn yr1
Protein production and analysis* (747618S)	10	autumn yr1
Orientation to research work (744628S) / Orientation to biochemical work (744629S)	10-20	Autumn yr 1-Spring yr 1
MSc thesis (Pro gradu) (744691S)	30	
MSc thesis, additional experimental work (in 5 ECTS blocks) (744692S)	0-30	
Maturity test (M.Sc. degree) (740672S)	0	
<b>Optional specialist courses (a minimum of 3 of these courses must be taken)</b>		
Hypoxia response pathway – molecular mechanisms and medical applications (743664S)	5	autumn



Introduction to big data analysis and bioinformatics models (744634S)	5	Spring
Molecular, cell biological and genetic aspects of diseases (743665S)	5	autumn
Extracellular matrix (743662S)	5	Autumn
Developmental biology, stem cells and tissue engineering (743663S)	5	spring
Tumor cell biology (743668S)	5	spring
<b>Other optional courses</b>		
In silico methodologies in biochemistry and molecular medicine (747613S)	5	Spring
Biochemical methodologies II (747616S)	10	Autumn yr1
Dissertation (744631S)	15	
Virology (743667S)	5	spring
Scientific presentation (744625S)	1-2	
Introduction to immunology (743666S)	5	Spring
Final examination in molecular medicine (743690S)	10	
Yeast genetics (744632S)	5	Spring
Biochemistry and biotechnology of protein folding (747617S)	5	Spring
Biochemical and biomedical Innovation (740381A)	2-5	yr1-yr2
Introduction to structure-based drug discovery ( 747615S)	5	Spring
Advanced information skills (300002M, Science and Technology library Tellus)	1	
Plant hormones (756627S)(Dept. of Biology)	4	Spring
Biomedical imaging methods (580402S) (Institute of biomedicine)	4	
Using animals in research - carrying out procedures (040911S, Laboratory Animal Centre )*	3	spring
<i>Minor in Introduction to business studies</i>		<i>OBS</i>
Strategic Management ( <a href="#">724103P</a> )	5	yr1-yr2
Management Accounting ( <a href="#">724105P</a> )	5	yr1-yr2
Principles of Marketing ( <a href="#">724106P</a> )	5	yr1-yr2
Investment Decisions ( <a href="#">724109P</a> )	5	yr1-yr2
Introductory Economics ( <a href="#">724110P</a> )	5	yr1-yr2

<i>Minor in Industrial engineering and management</i>		<i>IEM</i>
Basics of industrial engineering and management ( <a href="#">555225P</a> )	5	yr1-yr2
Project management ( <a href="#">555285A</a> )	5	yr1-yr2
Product development ( <a href="#">555242A</a> )	5	yr1-yr2
Managing well-being and quality of working life ( <a href="#">555264P</a> )	5	yr1-yr2
Process and quality management ( <a href="#">555286A</a> )	5	yr1-yr2
<i>Minor in Entrepreneurship</i>		<i>OBS</i>
Entrepreneuring for Tomorrow ( <a href="#">724811A</a> )	5	yr1-yr2
Building Change Through Entrepreneurship ( <a href="#">724812A</a> )	5	yr1-yr2
Entrepreneurship in Action ( <a href="#">724813A</a> )	5	yr1-yr2
Introduction to Business Development ( <a href="#">724814A</a> )	5	yr1-yr2
Entrepreneurial Assignment ( <a href="#">724815A</a> )	5	yr1-yr2
Building Business Through Creativity and Collaboration ( <a href="#">724816A</a> )	5	yr1-yr2

\*probably this course is not organized every year in English

### Optional courses at any universities

Other suitable courses taught at any university (for minimum 120 credits of MSc Degree) will be accepted as optional studies. Courses given in research units eg. Biocenter Oulu will be accepted. Courses must be connected to biochemistry or logically support some aspect of it and they will have to be at an appropriate level. The content of the courses must not be too similar to other courses which have counted towards the students BSc degree or towards their MSc. In all cases Education Designer Jari Heikkinen should be contacted to confirm acceptance / suitability. We would advise that this is done before the course is taken, especially in the case of courses taken from universities outside Finland.

### Molecular medicine with a double MSc degree (120 credits)

Courses available in Oulu	cr	term
Protein chemistry II (744626S)*	5	Autumn yr1
Molecular biology II (744627S)*	5	Autumn yr1
Protein production and analysis (747618S)*	10	Autumn yr1

Orientation to research work (744628S) /Orientation to biochemical work (744629S)	0-20	yr1-yr2
MSc thesis (Pro gradu) (744691S)	30	
MSc thesis, additional experimental work (744692S, in 5 ECTS blocks )	0-30	
Maturity test (M.Sc. degree) (740672S)	0	
Hypoxia response pathway – molecular mechanisms and medical applications (743664S)*	5	autumn
Molecular, cell biological and genetic aspects of diseases (743665S)**	5	autumn
Extracellular matrix (743662S)**	5	autumn
Biochemical methodologies II (747616S)	10	autumn
Macromolecular X-ray crystallography (747614S)	5	autumn
Tumor cell biology (743668S)**	5	spring
Virology (743667S)	5	spring
Introduction to immunology (743666S)	5	spring
Scientific communication for biochemists ( 902154Y)	5	spring
Introduction to big data analysis and bioinformatics models (744634S)**	5	spring
Developmental biology, stem cells and tissue engineering (743663S)**	5	spring
In silico methodologies in biochemistry and molecular medicine (747613S)	5	spring
Introduction to structure-based drug discovery (747615S)	5	spring
Yeast genetics (744632S)	5	spring
Biochemistry and biotechnology of protein folding (747617S)	5	spring
Dissertation (744631S)	15	

#### Courses available in Ulm

Current concepts in stem cell biology and regenerative medicine (8810772137)	6	autumn
Bioinformatics and systems biology (8810772138)	6	autumn
New drug discovery, development and evaluation (8810772139)	5	autumn
Practical training in laboratory methods and correlative imaging (8810772140)	13	autumn
Molecular oncology (8810772133)	12	spring
GLP/GSP and bioethics (8810772141)	6	spring
Trauma research and regenerative medicine (8810772134)	12	spring
Signaling pathways in stem cells, development and aging (8810772135)	12	autumn
Clinical trials and project management and funding (8810772142)	6	autumn
Infectious diseases and immune defense (8810772136)	12	autumn

Students from Oulu need to take one (but may take two) terms in Ulm, and vice versa. The first year autumn term is always in the home university. The term in the other university may be either the first year spring or the second year autumn. In the former case the pro gradu thesis is done in the second year autumn (and the first year spring courses are done in the second year spring) and in the latter case the pro gradu thesis is done in the second year spring.

Students choose for each 15 ECTS study period courses such that the period may comprise of e.g. one 5 ECTS course and 10 ECTS worth of research work, or two 5 ECTS courses and 5 ECTS worth of research work, or 15 ECTS worth of research work. The research work periods count ECTS's towards the course Orientation to research work.

\*Compulsory courses: either Protein chemistry II and Molecular biology II together (10 ECTS) or Protein production and analysis (10 ECTS).

\*\* Students should take a minimum 3 of the 6 optional specialist courses: Tumor cell biology, Hypoxia, ECM, Introduction to big data analysis and bioinformatics models, Developmental Biology, Disease aspects

### **Optional courses at any universities**

Other suitable courses taught at any university (for minimum 120 credits of MSc Degree) will be accepted as optional studies. Courses given in research units eg. Biocenter Oulu will be accepted. Courses must be connected to biochemistry or logically support some aspect of it and they will have to be at an appropriate level. The content of the courses must not be too similar to other courses which have counted towards the students BSc degree or towards their MSc. In all cases Education Designer Jari Heikkinen should be contacted to confirm acceptance / suitability. We would advise that this is done before the course is taken, especially in the case of courses taken from universities outside Finland.

### **Faculty Staff**

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# Tutkintorakenteet

## M.Sc. degree, Biochemistry (Molecular medicine)

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

### Compulsory courses (50 - 90 op)

#### OBLIGATORY COURSES

744635S Protein production and analysis I 5op  
 744627S Molecular biology II 5op  
 744636S Protein production and analysis II 5op\*  
 744628S Orientation to research work 0 - 15op\*\*  
 744629S Orientation to biochemical work 0 - 15op \*\*  
 744691S MSc thesis (Pro gradu) 30op\*\*\*  
 744692S MSc thesis, additional experimental work 0 - 30op  
 740672S Maturity test (M.Sc.degree), 0 ECTS cr

\* Obligatory for students who have not taken Protein chemistry I. This course cannot be taken by students who have done Protein chemistry I.

\*\* The sum of credits of both courses must be 10-20 ECTS

\*\*\*The Master's thesis length is 1 year from the start of MSc thesis research work. Laboratory research work duration is flexible and based on either a 3 months laboratory research period ( MSc thesis 744691S, 30 study credits, includes the credits for writing of the thesis/ProGradu) or a research period of 3 months plus a maximum of 18 additional weeks, when 5 study credits can be earned for every 3 additional weeks of research work ( MSc thesis, additional experimental work 744692S, maximally 30 additional credits). The maximum laboratory research period duration is approximately 8 months, and the research period duration should be already decided on before study plan submission. Research work for the MSc thesis can be completed in a university research group, in another research organization or in a company. A maturity test of the topic of the thesis must also be written (0 ECTS).

H325433: Compulsory courses - MSc, molecular medicine, 71 op

#### *Compulsory courses*

744635S: Protein production and analysis I, 5 op  
 744627S: Molecular biology II, 5 op  
 744636S: Protein production and analysis II, 5 op  
 744628S: Orientation to research work, 0 - 15 op  
 744629S: Orientation to biochemical work, 0 - 15 op  
 744691S: MSc thesis (Pro gradu), 30 op  
 744692S: MSc thesis, additional experimental work, 0 - 30 op  
 740672S: Maturity test (M.Sc. degree), 0 op

### Optional specialist courses (at least 3 must be taken) (15 - 30 op)

743664S Hypoxia response pathway - molecular mechanisms and medical applications, 5 cr

743665S Molecular, cell biological and genetic aspects of diseases, 5 cr

743662S Extracellular matrix, 5 cr

743663S Developmental biology, stem cells and tissue engineering, 5 cr

743668S Tumor cell biology, 5 cr

744634S Introduction to big data analysis and bioinformatics models, 5 cr

H325434: Optional specialist courses - MSc, molecular medicine, 12 - 27 op

*Optional specialist courses (at least 3 must be taken)*

743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op

743665S: Molecular, cell biological and genetic aspects of diseases, 5 op

743662S: Extracellular matrix, 5 op

743663S: Developmental biology, stem cells and tissue engineering, 5 op

743668S: Tumor cell biology, 5 op

744634S: Introduction to big data analysis and bioinformatics models, 5 op

## Optional courses

In addition to compulsory and a minimum of 3 optional specialist courses, students must select other courses totaling 120cp. Students are free to take optional courses from all study lines offered by the Faculty of Biochemistry and Molecular Medicine or other MSc courses or any other suitable courses according to the students career aspirations. Courses not at the MSc level should be approved in advance. Students are allowed to take a minor, up to 30cp, in any subject, including an industrial placement or period of exchange. Students should consider carefully the length of the MSc thesis work. Students who chose a longer MSc thesis experimental work may have limited opportunities for a minor subject.

If you plan to take taught courses outside Oulu University please select the "optional courses at any university" option below. Please note that these should be approved in advance and that the Faculty of Biochemistry and Molecular Medicine has no responsibility towards covering any additional travel or living costs associated with taking such courses nor any fees incurred.

## Optional courses

H325435: Optional courses - MSc, molecular medicine, 14 - 37 op

*Other optional courses*

902154Y: Scientific Communication for Biochemists, 5 op

743666S: Introduction to immunology, 5 op

743667S: Virology, 5 op

743690S: Final examination in molecular medicine, 10 op

744625S: Scientific presentation, 1 - 2 op

740381A: Biochemical and biomedical innovation, 2 - 5 op

744631S: Dissertation, 15 op

300002M: Advanced Information Skills, 1 op

744632S: Yeast genetics, 5 op

747613S: In silico methodologies in biochemistry and molecular medicine, 5 op

756627S: Plant hormones, 5 op

080926A: Introduction to Biomedical Imaging Methods, 1 - 3 op

040911S: Using animals in research - carrying out procedures, 3 op

747616S: Biochemical methodologies II, 10 op

747617S: Biochemistry and biotechnology of protein folding, 5 op

747614S: Macromolecular X-ray crystallography, 5 op

747615S: Introduction to structure-based drug discovery, 5 op

744637S: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op

488321S: Bioreactor technology, 5 op

488305S: Advanced Course for Biotechnology, 5 op

740079Y: Activities in University and Student Organizations, 1 - 10 op

ay724102P: Management and Organizations (OPEN UNI), 5 op

ay724105P: Management Accounting (OPEN UNI), 5 op

ay724108P: Financial Markets (OPEN UNI), 5 op

555225P: Basics of industrial engineering and management, 5 op

555285A: Project management, 5 op

555242A: Product development, 5 op

ay724110P: Introductory Economics (OPEN UNI), 5 op

ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op  
 555264P: Managing well-being and quality of working life, 5 op  
 555286A: Process and quality management, 5 op  
 724811P: Entrepreneurship for Sustainability, 5 op  
 724812P: Building Change Through Entrepreneurship, 5 op  
 724813P: Entrepreneurship in Action, 5 op  
 724814P: Introduction to Business Development, 5 op  
 724815P: Entrepreneurial Assignment, 5 op  
 724816P: Building Business Through Creativity and Collaboration, 5 op

### Optional courses at any university

H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op

*Studies taken/planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

746601S: Advanced studies in biochemistry in other universities, 0 - 75 op

746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op

746609M: Studies in other universities/institutes, 0 - 50 op

## M.Sc. degree, Biochemistry (Protein Science and Biotechnology)

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

### Compulsory courses (60 - 100 op)

#### OBLIGATORY COURSES

744635S Protein production and analysis I 5op

744627S Molecular biology II 5op

744636S Protein production and analysis II 5op\*

747616S Biochemical methodologies II 10op

744628S Orientation to research work 0 - 15op\*\*

744629S Orientation to biochemical work 0 - 15op \*\*

744691S MSc thesis (Pro gradu) 30op\*\*\*

744692S MSc thesis, additional experimental work 0 - 30op

740672S Maturity test (M.Sc.degree), 0 ECTS cr

\* Obligatory for students who have not taken Protein chemistry I. This course cannot be taken by students who have done Protein chemistry I.

\*\* The sum of credits of both courses must be 10-20 ECTS

\*\*\*The Master's thesis length is 1 year from the start of MSc thesis research work. Laboratory research work duration is flexible and based on either a 3 months laboratory research period ( MSc thesis 744691S, 30 study credits, includes the credits for writing of the thesis/ProGradu) or a research period of 3 months plus a maximum of 18 additional weeks, when 5 study credits can be earned for every 3 additional weeks of research work ( MSc thesis, additional experimental work 744692S, maximally 30 additional credits). The maximum laboratory research period duration is approximately 8 months, and the research period duration should be already decided on before study plan submission. Research work for the MSc thesis can be completed in a university research group, in another research organization or in a company. A maturity test of the topic of the thesis must also be written (0 ECTS).

H325422: Compulsory courses - MSc, Protein science and biotechnology, 77 op

*Compulsory courses*

- 744635S: Protein production and analysis I, 5 op
- 744627S: Molecular biology II, 5 op
- 747616S: Biochemical methodologies II, 10 op
- 744628S: Orientation to research work, 0 - 15 op
- 744629S: Orientation to biochemical work, 0 - 15 op
- 744636S: Protein production and analysis II, 5 op
- 744691S: MSc thesis (Pro gradu), 30 op
- 744692S: MSc thesis, additional experimental work, 0 - 30 op
- 740672S: Maturity test (M.Sc. degree), 0 op

### **Optional specialist courses (at least 3 must be taken) (15 - 25 op)**

- 744634S Introduction to big data analysis and bioinformatics models, 5 op , spring
- 747613S In silico methodologies in biochemistry and molecular medicine 5 ECTS, spring
- 747614S Macromolecular X-ray crystallography 5 ECTS, autumn
- 747615S Introduction to structure-based drug discovery 5 ECTS, spring
- 747617S Biochemistry and biotechnology of protein folding 5 ECTS, spring
- H325425: Optional specialist courses - MSc / Int MSc, Protein science and biotechnology, 11,5 - 21,5 op  
*Optional specialist courses (a minimum of 3 of these courses must be taken)*
  - 747613S: In silico methodologies in biochemistry and molecular medicine, 5 op
  - 747614S: Macromolecular X-ray crystallography, 5 op
  - 747615S: Introduction to structure-based drug discovery, 5 op
  - 747617S: Biochemistry and biotechnology of protein folding, 5 op
  - 744634S: Introduction to big data analysis and bioinformatics models, 5 op

### **Optional courses**

In addition to compulsory and a minimum of 3 optional specialist courses, students must select other courses totaling 120cp. Students are free to take optional courses from all study lines offered by the Faculty of Biochemistry and Molecular Medicine or other MSc courses or any other suitable courses according to the students career aspirations. Courses not at the MSc level should be approved in advance. Students are allowed to take a minor, up to 30cp, in any subject, including an industrial placement or period of exchange. Students should consider carefully the length of the MSc thesis work. Students who chose a longer MSc thesis experimental work may have limited opportunities for a minor subject.

If you plan to take taught courses outside Oulu University please select the "optional courses at any university" option below. Please note that these should be approved in advance and that the Faculty of Biochemistry and Molecular Medicine has no responsibility towards covering any additional travel or living costs associated with taking such courses nor any fees incurred.

### **Optional courses**

- H325428: Optional courses - MSc, Protein science and biotechnology, 1,5 - 31,5 op  
*Optionall courses*
  - 902154Y: Scientific Communication for Biochemists, 5 op
  - 488321S: Bioreactor technology, 5 op
  - 488305S: Advanced Course for Biotechnology, 5 op
  - 744632S: Yeast genetics, 5 op
  - 747694S: Final examination in protein science and biotechnology, 10 op
  - 743666S: Introduction to immunology, 5 op
  - 743667S: Virology, 5 op
  - 744625S: Scientific presentation, 1 - 2 op
  - 740381A: Biochemical and biomedical innovation, 2 - 5 op
  - 744631S: Dissertation, 15 op
  - 300002M: Advanced Information Skills, 1 op
  - 080926A: Introduction to Biomedical Imaging Methods, 1 - 3 op
  - 756627S: Plant hormones, 5 op



040911S: Using animals in research - carrying out procedures, 3 op  
 743662S: Extracellular matrix, 5 op  
 743663S: Developmental biology, stem cells and tissue engineering, 5 op  
 743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op  
 743665S: Molecular, cell biological and genetic aspects of diseases, 5 op  
 740079Y: Activities in University and Student Organizations, 1 - 10 op  
 743668S: Tumor cell biology, 5 op  
 744637S: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op  
 ay724102P: Management and Organizations (OPEN UNI), 5 op  
 ay724105P: Management Accounting (OPEN UNI), 5 op  
 ay724108P: Financial Markets (OPEN UNI), 5 op  
 ay724110P: Introductory Economics (OPEN UNI), 5 op  
 ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op  
 555225P: Basics of industrial engineering and management, 5 op  
 555285A: Project management, 5 op  
 555242A: Product development, 5 op  
 555264P: Managing well-being and quality of working life, 5 op  
 724811P: Entrepreneurship for Sustainability, 5 op  
 555286A: Process and quality management, 5 op  
 724812P: Building Change Through Entrepreneurship, 5 op  
 724813P: Entrepreneurship in Action, 5 op  
 724814P: Introduction to Business Development, 5 op  
 724815P: Entrepreneurial Assignment, 5 op  
 724816P: Building Business Through Creativity and Collaboration, 5 op

### Optional courses at any university

H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op

*Studies taken/planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

746601S: Advanced studies in biochemistry in other universities, 0 - 75 op

746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op

746609M: Studies in other universities/institutes, 0 - 50 op

## B.Sc. degree with exchange, Biochemistry

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

### General studies (8 op)

General studies are obligatory for all students. For biochemists the Swedish courses are 3 credits.

902100Y: English for Biochemists 1, 3 op

740076Y: Orientation, 2 op

901051Y: Second Official Language (Swedish), Oral Skills, 2 op

901050Y: Second Official Language (Swedish), Written Skills, 1 op

### Obligatory basic studies in biochemistry (30 op)

Basic studies are obligatory for all students.

740144P: Biochemical Methodologies I, 8 op

740143P: Biomolecules for Biochemists, 8 op

740146P: Metabolism I, 6 op  
 740145P: Physical Biochemistry, 6 op  
 740150P: Transferable skills for biochemists, 2 op

### **Intermediate studies in biochemistry (61 op)**

Intermediate studies are obligatory for all students.

740376A: Bachelor's Thesis, 10 op  
 740362A: Cellular Biology, 6 op  
 740366A: Cellular Communication, 6 op  
 740372A: Final Examination, 6 op  
 740377A: Maturity test (B.Sc. degree), 0 op  
 740367A: Metabolism II, 6 op  
 740363A: Microbiology, 6 op  
 740361A: Molecular Biology I, 8 op  
 740386A: Physiological biochemistry, 5 op  
 740364A: Protein Chemistry I, 8 op

### **Obligatory studies in Chemistry (20 op)**

The chemistry courses below are obligatory for all students.

780117P: General and Inorganic Chemistry A, 5 op  
 780118P: General and Inorganic Chemistry B, 5 op  
 780116P: Introduction to Organic Chemistry, 5 op  
 780123P: Introductory Laboratory Works in Chemistry, 5 op

### **Obligatory studies in Biology (8 op)**

The courses below are obligatory for all students. Within the Concepts of genetics for biochemists course biochemists take parts 1 and 3 of course Concept of genetics (757109P, 5 ECTS cr).

757122P: Concepts of genetics for biochemists, 3 op  
 750122P: Introduction to cell biology and physiology, 5 op

#### *Compulsory*

750122P-01: Introduction to cell biology and physiology, genetics, 0 op  
 750122P-04: Introduction to cell biology and physiology, animal physiology, 0 op  
 750122P-03: Introduction to cell biology and physiology, plant cell biology, 0 op  
 750122P-02: Introduction to cell biology and physiology, animal cell biology, 0 op

### **Obligatory studies in Statistics (10 op)**

The statistics courses below are obligatory for all students.

806119P: A Second Course in Statistics, 5 op  
 806118P: Introduction to Statistics, 5 op

### **Appropriate language studies (enintään 10 op)**

Appropriate compulsory language studies (max. 10 credits) should be taken prior the exchange period. The courses can be selected from repertoire of Language and Communication and/or Open university. Autumn yr2-autumn yr3 is the ideal period for these studies. If appropriate language course is a subject to a charge Dean for Education will accept the course before it starts. The language courses given by the host university at the beginning of exchange period will be accepted too. Students are recommended to check the study guide book of Extension school to find courses for students of all faculties.

### **Biochemical studies in the host university (12 - 30 op)**

Studies taken in the host university can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.

746103P: Basic studies in biochemistry passed abroad, 0 - 75 op

746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op

746609M: Studies in other universities/institutes, 0 - 50 op

## Optional studies (vähintään 43 op)

BSc degree in biochemistry with international exchange includes 43 credits of optional studies. A minimum of 12 credits of these must be passed in host university during exchange period (biochemistry courses). Recommended optional courses at University of Oulu are put together in the timetable so that they do not clash with obligatory courses. However, students are free to select other university courses either in Finland or abroad. The content of courses must not be too similar to obligatory courses. Courses taken outside University of Oulu should be agreed with Education designer Jari Heikkinen in advance. BSc studies must include a minor subject that comprises at least 25op of basic / intermediate studies. Students are advised to do the minor subject in either chemistry or biology (compulsory studies in these subjects can be included in the 25op total).

If You add other than recommended optional courses please, select option "other optional studies".

## Recommended optional studies

H325430: Recommended optional studies - BSc Int exchange, 4 - 30 op

### *Electives*

781305A: Organic Chemistry I, 5 op

780119P: Introduction to Analytical Chemistry, 5 op

030005P: Information Skills, 1 op

780329A: Laboratory Course I in Organic Chemistry, 4 op

740074Y: Tutoring/confidential posts, 1,5 op

## Other optional studies

H325436: Other Optional studies - BSc, 0 - 50 op

### *Set optional amount of credits in "Schedule"*

740387A: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op

740383A: Orientation to research work, 0 - 6 op

740382A: Orientation to biochemical work, 0 - 6 op

740381A: Biochemical and biomedical innovation, 2 - 5 op

740078Y: Working life course, 6 op

740079Y: Activities in University and Student Organizations, 1 - 10 op

ay724102P: Management and Organizations (OPEN UNI), 5 op

ay724105P: Management Accounting (OPEN UNI), 5 op

ay724108P: Financial Markets (OPEN UNI), 5 op

ay724110P: Introductory Economics (OPEN UNI), 5 op

ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op

555225P: Basics of industrial engineering and management, 5 op

555242A: Product development, 5 op

555285A: Project management, 5 op

555264P: Managing well-being and quality of working life, 5 op

555286A: Process and quality management, 5 op

724811P: Entrepreneurship for Sustainability, 5 op

724812P: Building Change Through Entrepreneurship, 5 op

724813P: Entrepreneurship in Action, 5 op

724814P: Introduction to Business Development, 5 op

724815P: Entrepreneurial Assignment, 5 op

724816P: Building Business Through Creativity and Collaboration, 5 op

H325431: Studies in biochemistry in other universities / abroad - BSc, 0 - 75 op

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

746102P: Basic studies in biochemistry in other universities, 0 - 75 op  
 746103P: Basic studies in biochemistry passed abroad, 0 - 75 op  
 746300A: Intermediate studies in biochemistry in other universities, 0 - 75 op  
 746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op  
 746609M: Studies in other universities/institutes, 0 - 50 op

## **B.Sc. degree, Biochemistry**

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

### **General studies (8 op)**

General studies are obligatory for all students. For biochemists the Swedish courses are 3 credits.

902100Y: English for Biochemists 1, 3 op  
 740076Y: Orientation, 2 op  
 901051Y: Second Official Language (Swedish), Oral Skills, 2 op  
 901050Y: Second Official Language (Swedish), Written Skills, 1 op

### **Obligatory basic studies in biochemistry (30 op)**

Basic studies are obligatory for all students.

740151P: Biochemical methodologies I, 10 op  
 740143P: Biomolecules for Biochemists, 8 op  
 740146P: Metabolism I, 6 op  
 740145P: Physical Biochemistry, 6 op

### **Intermediate studies in biochemistry (61 op)**

Intermediate studies are obligatory for all students.

740376A: Bachelor's Thesis, 10 op  
 740362A: Cellular Biology, 6 op  
 740366A: Cellular Communication, 6 op  
 740372A: Final Examination, 6 op  
 740377A: Maturity test (B.Sc. degree), 0 op  
 740367A: Metabolism II, 6 op  
 740363A: Microbiology, 6 op  
 740361A: Molecular Biology I, 8 op  
 740386A: Physiological biochemistry, 5 op  
 740364A: Protein Chemistry I, 8 op

### **Obligatory studies in Chemistry (20 op)**

The chemistry courses below are obligatory for all students.

780117P: General and Inorganic Chemistry A, 5 op  
 780118P: General and Inorganic Chemistry B, 5 op  
 780116P: Introduction to Organic Chemistry, 5 op  
 780123P: Introductory Laboratory Works in Chemistry, 5 op

## Obligatory studies in Biology (8 op)

The courses below are obligatory for all students. Within the Concepts of genetics for biochemists course biochemists take parts 1 and 3 (together 3cr) of course Concept of genetics (757109P, 5 ECTS cr). If student takes 5cr course two extra cr are not accepted to minimum 180cr (size of the degree must be at least 182cr).

757122P: Concepts of genetics for biochemists, 3 op

750122P: Introduction to cell biology and physiology, 5 op

### *Compulsory*

750122P-01: Introduction to cell biology and physiology, genetics, 0 op

750122P-04: Introduction to cell biology and physiology, animal physiology, 0 op

750122P-03: Introduction to cell biology and physiology, plant cell biology, 0 op

750122P-02: Introduction to cell biology and physiology, animal cell biology, 0 op

## Obligatory studies in Statistics (10 op)

The statistics courses below are obligatory for all students.

806119P: A Second Course in Statistics, 5 op

806118P: Introduction to Statistics, 5 op

## Optional studies (vähintään 43 op)

BSc degree in biochemistry includes 43 credits of optional studies. Recommended optional courses are put together in the time table so that they do not clash with obligatory courses. However, students are free to select other university courses either in Finland or abroad. The content of courses must not be too similar to obligatory courses. Courses taken outside University of Oulu should be agreed with Jari Heikkinen in advance. BSc studies must include a minor entity that comprises at least 25cr of basic / intermediate studies. Minor 25 cr can consist on any subject but student should bear in mind that obligatory courses in chemistry and biology are counted in 25cr entity in both subjects. Other recommended minors are Business studies, Industrial engineering and management and Entrepreneurship.

If You add other than recommended optional courses please, select option "other optional studies".

### Recommended optional studies

H325420: Recommended optional studies - BSc, 4 - 51 op

#### *Electives*

781305A: Organic Chemistry I, 5 op

780119P: Introduction to Analytical Chemistry, 5 op

030005P: Information Skills, 1 op

781307A: Laboratory Course I in Organic Chemistry, 5 op

040911S: Using animals in research - carrying out procedures, 3 op

755320A: Developmental biology-histology, 5 op

740074Y: Tutoring/confidential posts, 1,5 op

740385A: Virology, 5 op

740384A: Introduction to immunology, 5 op

### Other optional studies

H325436: Other Optional studies - BSc, 0 - 50 op

#### *Set optional amount of credits in "Schedule"*

740387A: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op

740383A: Orientation to research work, 0 - 6 op

740382A: Orientation to biochemical work, 0 - 6 op

740381A: Biochemical and biomedical innovation, 2 - 5 op

740078Y: Working life course, 6 op

740079Y: Activities in University and Student Organizations, 1 - 10 op

ay724102P: Management and Organizations (OPEN UNI), 5 op

ay724105P: Management Accounting (OPEN UNI), 5 op

ay724108P: Financial Markets (OPEN UNI), 5 op

- ay724110P: Introductory Economics (OPEN UNI), 5 op  
 ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op  
 555225P: Basics of industrial engineering and management, 5 op  
 555242A: Product development, 5 op  
 555285A: Project management, 5 op  
 555264P: Managing well-being and quality of working life, 5 op  
 555286A: Process and quality management, 5 op  
 724811P: Entrepreneurship for Sustainability, 5 op  
 724812P: Building Change Through Entrepreneurship, 5 op  
 724813P: Entrepreneurship in Action, 5 op  
 724814P: Introduction to Business Development, 5 op  
 724815P: Entrepreneurial Assignment, 5 op  
 724816P: Building Business Through Creativity and Collaboration, 5 op  
 H325431: Studies in biochemistry in other universities / abroad - BSc, 0 - 75 op  
*Studies taken/planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*  
 746102P: Basic studies in biochemistry in other universities, 0 - 75 op  
 746103P: Basic studies in biochemistry passed abroad, 0 - 75 op  
 746300A: Intermediate studies in biochemistry in other universities, 0 - 75 op  
 746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op  
 746609M: Studies in other universities/institutes, 0 - 50 op

## **Molecular Medicine, double degree, Master's Programme in Biochemistry, Master of Science**

Tutkintorakenteen tila: published

Lukuvuosi: 2020-21

Lukuvuoden alkamispäivämäärä: 01.08.2020

### **Courses available in Oulu (50 - 80 op)**

- |         |   |
|---------|---|
| 744635S | Protein production and analysis I, 5 ECTS cr, autumn*   |
| 744627S | Molecular biology II, 5 ECTS cr, autumn*  |
| 747636S | Protein production and analysis II 5 ECTS, spring*  |
| 743668S | Tumor cell biology**,5 ECTS cr, spring  |
| 747616S | Biochemical methodologies II, 10 ECTS cr, spring  |
| 743664S | Hypoxia response pathway – molecular mechanisms and medical applications**, 5 ECTS cr, autumn |
| 743665S | Molecular, cell biological and genetic aspects of diseases**, 5 ECTS cr, autumn               |
| 747613S | In silico methodologies in biochemistry and molecular medicine,5 ECTS cr, autumn              |
| 747614S | Macromolecular x-ray crystallography, 5 ECTS cr, autumn                                       |
| 743662S | Extracellular matrix**, 5 ECTS cr, autumn   |
| 744634S | Introduction to big data analysis and bioinformatics models**,5 ECTS cr, spring               |
| 902154Y | Scientific communication for biochemists,5 ECTS cr, spring                                    |

747617S	Biochemistry and biotechnology of protein folding,5 ECTS cr, autumn
743663S	Developmental biology, stem cells and tissue engineering**,5 ECTS cr, spring
744632S	Yeast genetics,5 ECTS cr, spring
747615S	Introduction to structure-based drug discovery,5 ECTS cr, spring
743666S	Introduction to immunology,5 ECTS cr, spring
743667S	Virology,5 ECTS cr, spring
744628S	Orientation to Research Work***, 0-20 ECTS cr
744629S	Orientation to Biochemical Work***, 0-20 ECTS cr
744631S	Dissertation, 15 ECTS cr
744691S	MSc thesis (Pro gradu)****, 30 ECTS cr
744692S	MSc thesis, additional experimental work**** (0-30 ECTS, in 5 ECTS blocks )
740672S	Maturity test (M.Sc. degree)****

\*Compulsory courses: Protein production and analysis I and Molecular biology II. Protein production and analysis II (5 ECTS) is obligatory for students who have not taken Protein chemistry I. This course cannot be taken by students who have done Protein chemistry I.

\*\*Students should take a minimum 3 of the 6 optional specialist courses: Tumor cell biology, Hypoxia, ECM, Systems Biology, Developmental Biology, Disease aspects

\*\*\*The sum of credits of both courses must be 10-20 ECTS

\*\*\*\*The Master's thesis length is 1 year from the start of MSc thesis research work. Laboratory research work duration is flexible and based on either a 3 months laboratory research period ( MSc thesis 744691S, 30 study credits, includes the credits for writing of the thesis/ProGradu) or a research period of 3 months plus a maximum of 18 additional weeks, when 5 study credits can be earned for every 3 additional weeks of research work ( MSc thesis, additional experimental work 744692S, maximally 30 additional credits). The maximum laboratory research period duration is approximately 8 months, and the research period duration should be already decided on before study plan submission. Research work for the MSc thesis can be completed in a university research group, in another research organization or in a company. A maturity test of the topic of the thesis must also be written (0 ECTS).

H325437: Optional courses available in Oulu - Molecular Medicine Double Degree, 60 - 90 op

*You must select 60-90 credits of these courses*

- 744691S: MSc thesis (Pro gradu), 30 op
- 744692S: MSc thesis, additional experimental work, 0 - 30 op
- 744635S: Protein production and analysis I, 5 op
- 744627S: Molecular biology II, 5 op
- 744636S: Protein production and analysis II, 5 op
- 744628S: Orientation to research work, 0 - 15 op
- 744629S: Orientation to biochemical work, 0 - 15 op
- 743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op
- 743665S: Molecular, cell biological and genetic aspects of diseases, 5 op
- 743662S: Extracellular matrix, 5 op
- 743668S: Tumor cell biology, 5 op
- 743663S: Developmental biology, stem cells and tissue engineering, 5 op
- 744634S: Introduction to big data analysis and bioinformatics models, 5 op
- 747616S: Biochemical methodologies II, 10 op
- 743667S: Virology, 5 op
- 747614S: Macromolecular X-ray crystallography, 5 op
- 743666S: Introduction to immunology, 5 op
- 902154Y: Scientific Communication for Biochemists, 5 op

747613S: In silico methodologies in biochemistry and molecular medicine, 5 op  
 747615S: Introduction to structure-based drug discovery, 5 op  
 744632S: Yeast genetics, 5 op  
 747617S: Biochemistry and biotechnology of protein folding, 5 op  
 744631S: Dissertation, 15 op

### Optional courses available in Ulm (30 - 60 op)

8810772137 Current concepts in stem cell biology and regenerative medicine, 5 ECTS cr, winter  
 8810772138 Bioinformatics and systems biology, 6 ECTS cr, winter  
 8810772139 New drug discovery, development and evaluation, 5 ECTS cr, winter  
 8810772140 Practical training in laboratory methods and correlative imaging, 13 ECTS cr, winter  
 8810772133 Molecular oncology, 12 ECTS cr, summer  
 8810772141 GLP/GSP and bioethics, 6 ECTS cr, summer  
 8810772134 Trauma research and regenerative medicine, 12 ECTS cr, summer  
 8810772135 Signaling pathways in stem cells, development and aging, 12 ECTS cr, winter  
 8810772142 Clinical trials and project management and funding, 6 ECTS cr, winter  
 8810772136 Infectious diseases and immune defense, 12 ECTS cr, summer  
 8810780000 Master thesis and disputation including journal club and progress report, 30 ECTS cr, summer

Minimum of 30 ECTS credits has to be obtained at the host institution.

Studies taken / planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following code (746601S Advanced studies in biochemistry in other universities).

H325438: Optional courses available in Ulm - Molecular Medicine Double Degree, 30 - 60 op

### Optional courses at any university

Other suitable courses taught at any university (for minimum 120 credits of MSc Degree) will be accepted as optional studies. Courses given in research units eg. Biocenter Oulu will be accepted. Courses must be connected to biochemistry or logically support some aspect of it and they will have to be at an appropriate level. The content of the courses must not be too similar to other courses which have counted towards the students BSc degree or towards their MSc. In all cases Education Designer Jari Heikkinen should be contacted to confirm acceptance / suitability. We would advise that this is done before the course is taken, especially in the case of courses taken from universities outside Finland.

Studies taken / planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.

H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*



746601S: Advanced studies in biochemistry in other universities, 0 - 75 op

746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op

746609M: Studies in other universities/institutes, 0 - 50 op

## Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

740148P: Biomolecules, 5 op

740147P: Biomolecules for Bioscientists, 8 op

724108P: Financial Markets, 5 op

724111P: Finnish Economy and Economic Policy, 5 op

724110P: Introductory Economics, 5 op

724105P: Management Accounting, 5 op

724102P: Management and Organizations, 5 op

740149P: Metabolism I, 4 op

740374A: Microbiology, 3 op

740373A: Molecular Biology I, 4 op

746606S: Project work in Biochemistry, 1,5 op

744626S: Protein chemistry II, 5 op

747618S: Protein production and analysis, 10 op

## Opintojaksosten kuvaukset

### Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

#### H325433: Compulsory courses - MSc, molecular medicine, 71 op

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

#### *Compulsory courses*

#### **744635S: Protein production and analysis I, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

42 contact hours (includes 8 hours of problem solving classes plus other exercises)

**Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

BSc in biochemistry or a closely related subject

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (problem solving exercises)

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**744627S: Molecular biology II, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Elitsa Dimova**Opintokohteen kielet:** English**Leikkaavuudet:**

744621S Molecular biology II 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

After the course students are able to:

- describe the general features of DNA manipulating enzymes and CRISPR-Cas9
- design (on paper or in silico) oligonucleotides for PCR amplification
- design and set up restriction digests and ligation reactions in order to carry out basic and advanced cloning procedures
- analyze experimental results from basic cloning procedure
- use basic datasets and basic online bioinformatics tools for genetic engineering

**Contents:**

This module provides a "real-life" approach to practical molecular biology, including DNA cloning strategies, site directed mutagenesis, generation of transgenic mice, etc. It comprises concept overview lectures, complex problem solving based exercises and includes written reports and student presentations. Attendance of the course is required.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

18 h seminars, plus student presentations

**Target group:**

Major students

**Prerequisites and co-requisites:**

The course is designed for MSc students familiar with DNA organization, gene structure & genetic concepts (ORF, codon, heterologous and homologous recombination).

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

This course utilizes continuous assessment based on problem solving based exercises, written reports, student presentation, and crossword solutions. All tasks should be passes by minimum of 60%. Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Elitsa Dimova

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744636S: Protein production and analysis II, 5 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 contact hours +80 hours of lab

**Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

PPA I or equivalent. This course cannot be taken by people who have done Protein Chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744628S: Orientation to research work, 0 - 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744617S Orientation to research work 0.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to research work via the active integration of students into research groups and/or via one to two week advanced practical courses. The integration into groups can be either full-time or part-time research work, with 5op being awarded for each three full-time weeks equivalent worked. The research groups do not need to be in the Faculty of Biochemistry and Molecular Medicine, University of Oulu, but advance permission should be sought if the research group is not part of the University of Oulu.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744628S and 744626S (Orientation to biochemical work) must be 10-20 credits.

**744629S: Orientation to biochemical work, 0 - 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744624S Orientation to biochemical work 0.0 op

**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to non-research work in companies or other suitable environment. The work can be either full-time or part-time work, with 5op being awarded for each three full-time weeks equivalent worked. Each placement must be agreed in advance with the responsible person.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744629S and 744628S (Orientation to research work) must be 10-20 credits.

**744691S: MSc thesis (Pro gradu), 30 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Diploma thesis**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** English**ECTS Credits:**

30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis work students have:

- increased appreciation of how research leads to knowledge and developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management
- developed skills in retrieving, critically appraising and integrating information as well as skills in communicating science and making and defending scientific arguments

**Contents:**

This module provides an extensive 3 month project in a research group as well as a written MSc thesis. The experimental work can be started after 30 cp of Masters studies have been completed, but it is recommended that the MSc thesis work is the final module taken in the MSc. Students are responsible for finding a suitable research group in academia or in industry in which they wish to undertake the MSc thesis work. The work may be undertaken in the research groups of the Faculty of Biochemistry and Molecular Medicine or in any other suitable research group in Finland or abroad. Students should produce a short (typically 2 page) study plan detailing the proposed content of their MSc thesis work, supervisor(s), location of the research work and start date. This should be produced at least 2 weeks before the proposed start date and must be approved before they start work. The MSc thesis is based only on the work done during the first 3 months of work (plus a possible extension of 5-20cp, see 744692 MSc thesis, additional experimental work) by the student on the project, except in cases of mitigating circumstances. The MSc thesis (typically 50-60 pages long) is based on the experimental work undertaken by the student and the contextualization of the research and the results based on published literature in the field. For detailed instructions see <http://www oulu.fi/fbmm> The thesis must be submitted within 1 year of the start date, except in cases of mitigating circumstances.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

At least 30cp of MSc level studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written thesis. Read more about assessment criteria at <http://www oulu.fi/fbmm>

**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

-

**744692S: MSc thesis, additional experimental work, 0 - 30 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**ECTS Credits:**

5-30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis additional experimental work students have:

- increased appreciation of how research leads to knowledge
- developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management

**Contents:**

This module provides additional experimental time for the MSc thesis work in 5cp blocks. Students should carefully consider the balance between the time required for the experimental part of the MSc thesis based on the topic chosen versus the benefits of additional courses in biochemistry, ancillary subjects or a minor in another subject. If additional experimental work is planned before the start of the thesis this should be indicated on the study plan (see 747691S MSc thesis). If there are proposed changes to the length of the experimental work during the MSc thesis the responsible person should be notified.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

747691S MSc thesis is a co-requisite

**Recommended optional programme components:**

-

**Recommended or required reading:**



-

**Assessment methods and criteria:**

Experimental work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

-

**740672S: Maturity test (M.Sc. degree), 0 op****Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Tuomo Glumoff**Opintokohteen kielet:** Finnish**ECTS Credits:**

0 credits

**Language of instruction:**

Finnish / English

**Timing:**

M.Sc. yr2

**Learning outcomes:**

-

**Contents:**

Will be written in context to MSc thesis. In the test student must show a good command of both language skills and their field of MSc thesis. If student's native language is not Finnish or Swedish Faculty of Biochemistry and Molecular Medicine will define language in the test.

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written abstract of MSc thesis

**Grading:**

pass/fail

**Working life cooperation:**

No

**Other information:**

-

## H325434: Optional specialist courses - MSc, molecular medicine, 12 - 27 op

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Optional specialist courses (at least 3 must be taken)*

### 743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op

**Voimassaolo:** 01.03.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Karppinen, Peppi Leena Elina

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- Present and discuss the basic mechanisms involved in regulation of oxygen homeostasis on cellular, tissue, organ/organism level
- To integrate/adapt regulation of oxygen homeostasis under normal physiological conditions to pathological situations
- Display an understanding on how the basic biochemical knowledge translates from the bench to the bedside
- Understand the meaning of translational research

**Contents:**

General physiology of hypoxia, Hypoxia response in bacteria, Hypoxia response in yeast, Hypoxia-inducible factors (HIFs), Regulation of HIFs on the transcriptional, translational and post-translational level, Conditions related to hypoxia response (erythropoiesis and iron regulation, angiogenesis and metabolism), Experimental models to study hypoxia, HIFs and HIF prolyl 4-hydroxylases as drug targets. Lecture topics may vary.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 22 h seminars (obligatory) and 4 h round table discussions (obligatory).

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles.

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Peppi Karppinen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743665S: Molecular, cell biological and genetic aspects of diseases, 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Valerio Izzì**Opintokohteen kielet:** English**Leikkaavuudet:**

740396A	Molecular, cell biological and genetic aspects of diseases	5.0 op
743659S	Biochemistry of cell organelles	3.0 op
743604S	Biochemistry of inherited diseases	3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- based on biogenesis, structure and function of the key cell organelles discuss their role in pathology and describe organelle-specific disease mechanisms
- describe typical inherited diseases in terms of their occurrence, biochemistry behind their origin, and their analysis and treatment possibilities
- present and defend a scientific presentation on a theme related to inherited diseases.

**Contents:**

The course provides knowledge on structure and function of mitochondria, peroxisomes, endoplasmic reticulum (ER) and the Golgi apparatus, and diseases - also inherited ones - concerned with these cell organelles; as well as gene defects, their inheritance, detection and correction with gene therapy. The course involves student presentations of latest findings on inherited diseases as pair work.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

34 h lectures and seminars including student presentation and student opponents. Seminars are obligatory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

B.Sc. in biochemistry or biology or otherwise adequate knowledge on basic biochemistry and cellular and molecular biology.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles. Recommended accompanying texts: Thompson & Thompson, Genetics in Medicine; Strachan, T., Read, A.P.: Human Molecular Genetics, Bios. Scientific Publishers Limited; Aula et al., Perinnöllisyyslääketiede

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas

**743662S: Extracellular matrix, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Heljasvaara, Ritva-Leena

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- Describe the structure and key components of the mammalian ECM
- Describe the main significance of the ECM for cell and tissue function
- Outline the roles of ECM in inherited connective tissue disorders and in common other diseases
- Identify connective tissue and some of its components in tissue samples using various staining protocols (laboratory work).
- Summarize background knowledge of ECM sufficiently to feel comfortable in undertaking a postgraduate research project in the ECM field

**Contents:**

Besides including basic background knowledge on the ECM, the course will highlight the ECM-related topics that are currently being investigated at the Faculty of Biochemistry and Molecular Medicine. Orientation to mouse and cell models of ECM molecules will form a crucial part in teaching. Contents of lectures in 2019: Collagens and collagen-related hereditary diseases; Proteoglycans and glycoproteins; Basement membranes; Pericellular matrix of the vasculature; Integrins and other ECM receptors; Matricellular proteins; Elastic fibres; ECM plasticity and remodeling; ECM degrading enzymes; Stem cell microenvironments; ECM in fibrosis and cancer. The course has limited enrollment for 28 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

23 h lectures, 6 h seminars, and 36 h laboratory work. Seminars and laboratory work are compulsory

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

**Extracellular Matrix Biology** Eds. Richard O. Hynes and Kenneth M. Yamada, 2011. Cold Spring Harbor Perspectives in Biology

[http://cshperspectives.cshlp.org/site/misc/extracellular\\_matrix\\_biology.xhtml](http://cshperspectives.cshlp.org/site/misc/extracellular_matrix_biology.xhtml)

**Assessment methods and criteria:**

Continuous assessment, final exam

**Grading:**

1-5/fail

**Person responsible:**

Ritva Heljasvaara

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743663S: Developmental biology, stem cells and tissue engineering, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Aleksandra Rak-Raszewska, Vainio Seppo

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

Upon completion of the course the student have obtained an overview of how the development of tissues and organs is regulated and executed via developmental gene regulation and developmental programs behind morphogenesis. Students will become familiar with the classical and modern experimental embryological techniques during lectures and also with hands-on laboratory work.

**Contents:**

The course provides knowledge on use of various model organisms, basic information about embryology and early developmental mechanisms and signaling molecules. Introduces detailed description of development of few organ systems and provides knowledge about classical and novel study techniques to discover new developmental ques. The course has limited enrollment for 16 students. Lecture part (2 credits) is open for all students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 h lectures and seminars, 3 assessments and 25 h laboratory work. Lectures (100% attendance), assessments and laboratory work are compulsory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, no exam

**Grading:**

1-5/fail

**Person responsible:**

Seppo Vainio and Aleksandra Rak-Raszewska

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743668S: Tumor cell biology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

743657S Tumor cell biology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- name, list and discuss the major aspects including formation of a tumor cell
- present, describe and discuss characteristic aspects of oncogenes and tumor suppressor genes
- use methods to study, examine and to analyse tumor genesis and tumor progression

**Contents:**

The course covers basic aspects of the main pathways inducing formation of a tumor. The main emphasis will be made on modes of carcinogenesis, tumor metabolism, the formation of oncogenes, the action of tumor suppressor genes and the induction of tumors by viruses.

The course covers also aspects of tumor diagnostics and therapy. The course involves lectures 20h with included 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures and student presentations upon request in seminars

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744634S: Introduction to big data analysis and bioinformatics models, 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Valerio Izzì

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744640S	Data mining and data-based models	5.0 op
740393A	Data mining and data-based models	5.0 op

**ECTS Credits:**

5 cr

**Language of instruction:**

English

**Timing:**

Spring

**Learning outcomes:**

Upon completion the student should be able to:

- Identify, retrieve and contextualize knowledge from major online biomedical sources
- Identify, retrieve and analyze big biomedical data using open access resources and responsive databases
- Develop investigational pipelines for biomedical hypothesis and researches using available open data

**Contents:**

General principles of data identification, mining and analysis. Textual and contextual data evaluation. Repositories and databases of biomedical interest. Data analysis using open-access online tools, with examples from clinical and molecular studies. Machine learning. Multi-Omics integration. Contents may vary.

**Mode of delivery:**

Face to face teaching and online

**Learning activities and teaching methods:**

12 h lectures + online exercises

**Target group:**

MSc / Molecular medicine or Protein science and biotechnology

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Evaluation of assignment completion online

**Grading:**

pass/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

## **H325435: Optional courses - MSc, molecular medicine, 14 - 37 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Other optional courses*

### **902154Y: Scientific Communication for Biochemists, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course



**Vastuuyksikkö:** Languages and Communication

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Susan McAnsh

**Opintokohteen kielet:** English

**Leikkaavuudet:**

902101Y English for Biochemists 2 3.0 op

**Proficiency level:**

[C1](#) on the CEFR scale

**Status:**

Optional but highly recommended for 4th-year students in BSc-MSc degree programme and for students in International MSc programmes (Protein Science and Biotechnology; Molecular Biology with a Double MSc Degree)

**Required proficiency level:**

A minimum level of B2 (CEFR) is needed at the start of the course.

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. year 1 spring term

**Learning outcomes:**

By the end of the course, students will have demonstrated an ability to

1. write a research article that follows the main discourse conventions of biochemistry,
2. prepare and deliver an oral, scientific conference or teaching presentation supported by an effective slideshow,
3. apply the rules of referencing,
4. use a sufficient range of appropriate academic vocabulary relevant to their discipline,
5. report their work orally or in writing with accuracy and in an appropriate academic style,
6. structure their work for optimal clarity and impact,
7. make good use of feedback from peers and teachers to improve their own scientific production.

**Contents:**

This course will cover presentation skills (2 ECTS credits) and scientific research writing (3 ECTS credits). The course aims to help students acquire understanding of the conventions and expectations of the academic community of biochemists for scientific reporting, and develop presentation and writing skills for their future professional life.

**Mode of delivery:**

Contact teaching (lessons/lectures and tutorials), web-supported independent study

**Learning activities and teaching methods:**

Writing module: Lectures 12 hours, independent work alone and in pairs 68 hours. Presentation Skills module: Lectures 4-6 hours, small-group tutorials 3-6 hours, independent work alone and in pairs 12-19 hours of independent work.

**Target group:**

Students in the first year of their Master's programme

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Course materials will be provided in electronic form by the teachers in the two online course workspaces: *Scientific writing for biochemists* and *Scientific presentation for biochemists*.

**Assessment methods and criteria:**

Assessment is based on the learning outcomes of the course, paying attention to regular completion and quality of course tasks, with particular emphasis on the final product of each part of the course: the final presentation and the final draft of a research article.

**Grading:**

pass/fail

**Person responsible:**

Suzy McAnsh and Kari-Pekka Kallunki.

**Working life cooperation:**

-

**Other information:**

Teaching will take place at the Kontinkangas campus.

**743666S: Introduction to immunology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Zhi Chen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740379A Introduction to immunology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc yr1-yr2 spring

**Learning outcomes:**

After the course students will be able to understand, identify, analyze and apply essential concepts of cellular and molecular components and mechanisms of immunology, and integrate their previous knowledge of molecular and cellular biology and protein chemistry with immunology and immunobiochemistry instances

**Contents:**

The course handles the basis of immunology, covering cells and mechanisms of innate and adaptive immune responses (inflammation, anti-microbial and anti-viral defenses, T-cell activation, antibody production, etc.). The course also offers insights into the physiopathology of the immune responses (chronic inflammation, allergy, autoimmune disorders, transplantation and cancer) and the clinical (immunotherapy, cytokine therapy, etc.) and industrial (monoclonal antibodies, ELISA and immunodiagnosics, etc.) applications of immunological processes.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (14 h), a written home exercise, and a final exam.

**Target group:**

Major and minor subject undergraduates

**Prerequisites and co-requisites:**

Preliminary required courses: Molekyylibiologia I, Protein chemistry I and Solun biologia, or equivalent basic molecular biology, protein chemistry and cell biology studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Home exercise, final exam

**Grading:**

1-5/fail

**Person responsible:**

Jane Chen

**Working life cooperation:**

No

**Other information:**

This module is the same as 740384A Introduction to immunology. Location of instruction: Kontinkangas campus.

**743667S: Virology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

740380A Virology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- discuss the major groups of viruses and their infection and replication mechanisms
- present and discuss characteristic features of specific viruses and their relation to pathogenesis and immunity
- describe diagnostic methods and antiviral therapy

**Contents:**

The course covers basic aspects of virology. The main emphasis will be made on viral infection, replication, transcription, proteinsynthesis, virological diagnostics, infection kinetics, defense against viruses, ways of infection, vaccination, and antiviral therapy. The course involves lectures 10h, 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures and student presentations in seminars

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

This module is the same as Virology (740385A). Location of instruction: Kontinkangas

**743690S: Final examination in molecular medicine, 10 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-yr2

**Learning outcomes:**

Upon successful completion students (should) be able to:

- discuss the full breadth of the core topics of biochemistry and molecular medicine
- Integrate material from multiple sources

**Contents:**

This examination will test the ability of students to integrate knowledge from BSc and MSc level molecular medicine. The questions will require an understanding of the principles of biochemistry and molecular medicine and will be based on subject specific material from relevant BSc and MSc level modules. The format will be an oral examination

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Student self-study

**Target group:**

MSc/ molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Oral examination

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744625S: Scientific presentation, 1 - 2 op**

**Voimassaolo:** 01.03.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

1-2 credits

**Language of instruction:**

Finnish and English

**Timing:**

M.Sc.

**Learning outcomes:**

The student makes a presentation and participates in an international scientific conference with their own presentation. The presentation may be a poster, a talk or equivalent. The student uses the skills learned in the Bachelor's thesis course or otherwise in planning and realizing the presentation. The student practices communication skills necessary for research work.

**Contents:**

Student participates in a conference and delivers a poster, a talk or equivalent. The contents of which must include student's own results, for example from the Master's Thesis work. The pro gradu supervisor or other suitable person supervises the planning and realization of the presentation.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

A poster, a talk or equivalent is delivered. The workload of the course may vary depending on the extent and the form of presentation.

**Target group:**

Major students (MSc)

**Prerequisites and co-requisites:**

No compulsory preceding courses

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Study diary, a copy of presentation or poster

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

The amount of credits is estimated based on the workload of the planning and realization of the presentation, but not the length of the meeting.

**740381A: Biochemical and biomedical innovation, 2 - 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

2-5 credits

**Language of instruction:**

English

**Timing:**

Can be taken by any BSc / MSc / PhD student

**Learning outcomes:**

The aim of the course is to get student familiar with:

- the core skill set required to recognize opportunities/needs and how to validate creative ideas
- the core skill set of searching patent databases
- the concepts of intellectual property rights (IPR)
- the concepts of how to pitch an idea

**Contents:**

This module covers basic aspects of the key skills required for successful innovation in the field of biochemistry and molecular medicine. Concepts relating to how to recognize opportunities, how to recognize what is needed in the field, creative thinking, validating ideas and how to pitch ideas are covered as well as an introduction to intellectual property rights and patent searching. In addition to workshops /seminars (19 hours) the 5 ECTS version of course requires submission of an invention disclosure/proof of concept funding or submission of an entry to the biochemistry and molecular medicine innovation award.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

19 hours of lectures/workshops

**Target group:**

Major students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

For 2 ECTS participation in at least 70% of seminars/workshops. For 5 ECTS participation in at least 70% of the seminars/workshops plus submission of an invention disclosure / proof of concept funding application to the university (PhD students) or submission of an entry to the biochemistry and molecular medicine innovation award (BSc and MSc students).

**Grading:**

Pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744631S: Dissertation, 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744618S    Dissertation    18.0 op

**ECTS Credits:**

15 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2

**Learning outcomes:**

Upon successful completion students are able to:

- apply information in the right context, integrate information from a wide range of sources and evaluate it critically
- communicate science in extensive written format and discuss and defend scientific arguments
- demonstrate independent work including self motivation, planning, organizational skills and time management.

**Contents:**

This module is based around the student producing an extensive, in-depth literature report in the style of a scientific review. Students are responsible for finding a suitable supervisor for their dissertation with whom they will discuss the scientific background and relevant literature. Students are strongly encouraged to meet with their supervisor weekly to discuss progress and ideas and to resolve problems. A one-page outline of the dissertation subject area, including details of the supervisor (who need not be from the University of Oulu), must be approved by the module convener before starting this module. While the dissertation subject can be closely linked with the Pro Gradu project subject, students are advised that having distinct topics for these two modules will look better on their CV.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

400 hours of student work

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written report

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

-

**30002M: Advanced Information Skills, 1 op**

**Voimassaolo:** 01.08.2009 -

**Opiskelumuoto:** Other Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Science

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Klintrup, Outi-Mirjami

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

1 ECTS credit / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course is held once in the autumn semester, during period 2 and in the spring semester, during period 4. Intended for degree students working on their diploma/master's thesis.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information for their thesis



- know how to evaluate search results and information sources
- understands the principles of scientific publishing
- can use the reference management tool.

**Contents:**

Scientific information retrieval and the search terms, the most important databases and publication channels of the discipline, tools for evaluating the quality of scientific information and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 10 h, self-study 17 h

**Target group:**

Optional

**Recommended or required reading:**

Web learning material: [Subject guides](#)

**Assessment methods and criteria:**

Passing the course requires participation in the lectures and successful completion of the course assignments.

**Grading:**

pass/fail

**Person responsible:**

Outi Klintrup

**744632S: Yeast genetics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744623S Yeast genetics 6.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell a basic knowledge of yeast genetics and physiology
- tell the basic principles of using the yeast model organism to address fundamental genetic and cell biological problems
- (practical course) describe variety of genetic and molecular biology techniques commonly used to manipulate baker's yeast in the pursuit of biological questions

**Contents:**

This course is an introduction to *Saccharomyces cerevisiae* as a model organism and the use of classical and molecular genetic approaches in this yeast to study basic cellular processes. We will also focus on genetic screens and selections designed to identify targets of interest. Aspects of transcriptional regulation

will be discussed to provide a basic understanding for some of the screens and selections introduced. Performance in the course will be assessed by participation in the course review session at the beginning of each lecture (10% of total grade) and by a final written examination. The practical part of this is a block practical spread over two weeks (2 days – 3 days – 2 days – 3 days) running almost parallel to lecture course. It is designed to provide training in techniques and concepts commonly used in yeast genetics (streaking, spotting, mating, tetrad analysis, transformation, colony-color based assays, carbon source-dependent expression of genes, as well as generation and cloning of mutants). The course has limited enrollment for 16 people. It is also possible to only attend the lecture part of the course for 2.5 ECTS credits.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 10 days practical, final exam and oral participation in course review session

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Course review sessions, final exam, experiment reports Read more about [assessment criteria](#) at the University of Oulu webpage

**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**747613S: In silico methodologies in biochemistry and molecular medicine, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** André Juffer

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747603S Bioinformatics 2.5 op

747604S Introduction to biocomputing 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

### Learning outcomes:

After a successful completion of this course, students will have

- Obtained an appreciation of the quantitative aspects of analyzing scientific (big) data either stored in large data databases or generated by sophisticated modeling and simulation tools.
- Gained a basic understanding of applying various bioinformatics methods to large biological data sets.
- Realized the potential of scientific computing for the study of the behavior of biological systems, in particular large biological macromolecules.

### Contents:

This course aims at emphasizing the quantitative aspects of scientific research. For this, the course contains three intertwined components: (i) searching and evaluating nucleic acid and protein structural data from various databases, (ii) use of scientific computing to study structural, dynamical, functional and thermodynamical properties of proteins and membranes and their interaction with other molecules, and (iii) using biocomputing tools to access and analyze large and high-throughput data produced and accessible through biochemical and computational experiments.

Students will learn to access biological databases, search and retrieve relevant data, analyze data in a meaningful manner, and link data and results obtained from different tools. A very brief introduction to metabases and data compilation is provided as well. Interaction studies are emphasized through genome-wide mapping of protein-DNA interaction, proteomics-based bioinformatics, and high-throughput mapping of protein-protein interaction networks. Commonly employed modeling and simulation techniques will also be dealt with. These include molecular dynamics, Monte Carlo and Langevin (stochastic, Brownian) dynamics, continuum electrostatics, statistical thermodynamics, protein modeling techniques, protein-ligand docking, protein-ligand affinity calculations and the computer simulation of the protein folding process and enzyme action.

### Mode of delivery:

Face to face teaching

### Learning activities and teaching methods:

74 h contact sessions. Lectures and practicals, student tasks, including the presentation of an original article. Attendance to practicals and article presentation are mandatory.

### Target group:

MSc / Protein science and biotechnology

### Prerequisites and co-requisites:

-

### Recommended optional programme components:

-

### Recommended or required reading:

Books, articles:

1. Big data in biomedicine (<http://www.nature.com/nature/outlook/big-data/>)
2. Holzinger, A. Biomedical informatics, Springer, Heidelberg, 2014.
3. PubMed (Publications) (<http://www.ncbi.nlm.nih.gov/pubmed/>)
4. Leach, A.R., Molecular modelling. Principles and applications, Second edition, Prentice Hall, New York, 2001
5. Berendsen, H.J.C Simulating the physical world. Hierarchical modeling from quantum mechanics to fluid dynamics., Cambridge University Press, Cambridge, 2007

Useful databases:

1. GenBank (DNA) (<http://www.ncbi.nlm.nih.gov/nucleotide>)
2. Ensembl and Ensembl Genomes (Genome) (<http://www.ensembl.org/> and <http://ensemblgenomes.org/>)
3. UniProt (Protein) (<http://www.uniprot.org/>)
4. DIP and BioGrid (Protein Interaction) (<http://dip.doe-mbi.ucla.edu/dip/Main.cgi> and <http://thebiogrid.org/>)
5. PDB (protein structure database) (<http://www.rcsb.org/>)
6. Entrez (<http://www.ncbi.nlm.nih.gov/gquery/gquery.fcgi>)

### Assessment methods and criteria:

Practicals evaluation, article presentation, group discussion, and project report. No exam.

### Grading:

pass/fail

**Person responsible:**

André H. Juffer

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**756627S: Plant hormones, 5 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen oppimateriaali:**

Taiz, Lincoln , , 2006

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

M.Sc. 1 st or 2 nd spring, (arranged if resources allow).

**Learning outcomes:**

The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.

**Contents:**

Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

20 h and exam.

**Target group:**

Suitable for BSb and ecophysicologists.

**Prerequisites and co-requisites:**

Basics of functional plant biology lectures and exercises (752345A, 756341A).

**Recommended optional programme components:**

-

**Recommended or required reading:**

Moodle pages. Chapters concerning plant hormones from Taiz, L. et al. 2015. Plant Physiology and Development. 6 e. 761 p. Sinauer Associates, Inc. ISBN- 9781605352558 and literature given in the lectures.

The availability of the literature can be checked from [this link](#).

**Assessment methods and criteria:**

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail.

**Person responsible:**

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

**Working life cooperation:**

No.

**Other information:**

-

**080926A: Introduction to Biomedical Imaging Methods, 1 - 3 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Health Sciences

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lassi Rieppo

**Opintokohteen kielet:** English

**Proficiency level:**

-

**Status:**

-

**Required proficiency level:**

-

**ECTS Credits:**

1-3 ECTS credit points / 27-81 hours of work

**Language of instruction:**

English

**Timing:**

Master studies, spring term 4th period

**Learning outcomes:**

The student understands and can describe the basic principles and main applications of imaging methods used in biomedical research.

**Contents:**

Differences between in vivo, ex vivo and in vitro imaging.

Light and electron microscopy.

Optical projection and coherence tomography.

Optical in vivo imaging.

Magnetic resonance imaging.

Fourier transform infrared imaging spectroscopy and Raman imaging spectroscopy.

Micro-computed tomography.

Basics of image analysis and interpretation

**Mode of delivery:**

Face-to-face teaching. Compulsory participation in lectures.

**Learning activities and teaching methods:**

Number of ECTS cr of the course and the methods of implementation vary. The course includes lectures 19h, demonstrations 8h and final exam 3 h. Number of hours left for independent study depends on the number of the ECTS cr the student wishes to complete and is from 8 to 51 hours.

**Target group:**

All Bachelor's, Master's and postgraduate students interested in methods of biomedical imaging.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Handouts and literature given in the lectures

**Assessment methods and criteria:**

In this field, write with which method the teacher will monitor/

Participation in the lectures and demonstrations. Exam. The course can be completed with 1, 2 or 3 ECTS cr.

1 ECTS →# compulsory participation in lectures

2 ECTS →# compulsory participation in lectures and demonstrations

3 ECTS →# compulsory participation in lectures, demonstrations and final exam

Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

The 1 and 2 ECTS cr courses utilize verbal grading "pass" or "fail". The 3 ECTS cr course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr Lassi Rieppo

**Working life cooperation:**

-

**Other information:**

-

**040911S: Using animals in research - carrying out procedures, 3 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Laboratory Animal Centre

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Voipio Hanna-marja

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

040900S Using animals in research - carrying out procedures 2.5 op

Ei opintojaksokuvauksia.

**747616S: Biochemical methodologies II, 10 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ulrich Bergmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747608S Biochemical methodologies II 8.0 op

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

MSc 1st spring

**Learning outcomes:**

Upon successful completion students are able to:

- describe the theoretical basis of the main biochemical analysis methods for proteins
- use the different instruments
- describe the potential of the different analytical techniques and develop strategies for addressing specific questions in protein & proteome-analysis
- integrate data from multiple sources and evaluate it critically

**Contents:**

During this module students will analyze their own protein samples. The course will cover principles and practical applications of some of the more advanced methodologies used in practical biochemistry, including chromatography, fluorescence spectroscopy, stopped flow analysis of enzymatic reactions, circular dichroism, surface plasmon resonance, micro-calorimetry, mass spectrometry, and proteomics based on 2D electrophoresis and LCMS. For assessment each student has to write four research reports in the style of a scientific publication. Attendance is compulsory. The course has limited enrollment for 22 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

120 h lab., including pre-lab lectures plus exercises. For laboratory period a personal time table will be created for every student. Each student will spend about 1 full day and 5 half day's slots in the lab, plus one week proteomics lab with workload from 2h to full day.

**Target group:**

Obligatory for M.Sc. in Protein Science and biotechnology

**Prerequisites and co-requisites:**

Protein production and analysis I (744635S) and Protein production and analysis II (744636S) OR Protein chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Four reports written in style of a scientific publication

Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Ulrich Bergmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**747617S: Biochemistry and biotechnology of protein folding, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747611S Biochemistry of protein folding 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc., yr1-yr2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- present and discuss issues presented in the primary literature on a variety of aspects of protein folding.
- display an understanding of the theoretical and practical implications of in vivo, in vitro and in silico studies on protein folding and the integration of results.
- demonstrate the ability to interpret a wide range of data from multiple sources, to critically evaluate and contextualize this data and to solve problems relating to interpretation.

**Contents:**

This module provides an introduction to protein folding in vivo and in vitro. Topics covered include protein folding and quality control in the endoplasmic reticulum, mechanisms regulating protein folding including the unfolded protein response, the catalysis of native disulphide bond formation, the biochemistry of molecular chaperones and the role of molecular chaperones and protein folding catalysts in other cellular events. The application of this knowledge to biotechnology will also be discussed.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 contact hours of lectures and seminars

**Target group:**

M.Sc. in Protein science and biotechnology and exchange students

**Prerequisites and co-requisites:**

Protein chemistry I (740364A) or Protein production and analysis (747618S) or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The module is assessed based on reports prepared on individual topics and on participation in the seminars. Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas



**747614S: Macromolecular X-ray crystallography, 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lari Lehtiö, Wierenga Rikkert**Opintokohteen kielet:** English**Leikkaavuudet:**

747605S Basic aspects of protein crystallographic methods 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

After completion of this course students are able to:

- Discuss the key aspects of protein crystallization methods and interpret the results
- Describe the diffraction of X-rays and the importance of crystal symmetry
- Describe the importance of the Fourier transform method in the structure determination
- Describe the phase problem and tell the methods to solve it
- Apply knowledge on protein chemistry to refinement of a crystal structure
- Judge the quality of a protein structure

**Contents:**

The course will describe the principles of X-ray diffraction theory and practice. It includes a hands on project done throughout the course on protein crystallization, data collection, solving and refinement of the protein structure and validation of the model. Following topics will be covered during the lectures and practicals: crystallisation theory, symmetry of crystals, handling of crystals, data collection, diffraction pattern and the reciprocal lattice, the phase problem, molecular replacement, isomorphous and anomalous differences, structure refinement and validation. Attendance to the lectures and exercises is compulsory. The course has limited enrollment for 18 students

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

35 h lectures, 52 h exercises, project work and a research report

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

Protein chemistry I or Protein production and analysis or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

Rupp, B: Biomolecular Crystallography: Principles, Practice and Application to Structural Biology  
 Blow, D: Outline of Crystallography for Biologists (eBook available)  
 Drenth, J: Principles of Protein X-Ray Crystallography

**Assessment methods and criteria:**

Continuous assessment, research report, no exam.

**Grading:**

pass/fail

**Person responsible:**

Lari Lehtiö and Rikkert Wierenga

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**747615S: Introduction to structure-based drug discovery, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lari Lehtiö

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747612S Introduction to structure-based drug discovery 4.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

After completion of this course student should be able to:

- Find and analyze a protein structure of interest from databases from the point of view of drug discovery
- Critically assess a quality of an experimental protein-small molecule complex structure
- Discuss the process of creating a virtual small molecule library
- Describe the commonly used computational methods for screening of small molecule libraries against a protein target
- Critically judge the results of the computational screening

**Contents:**

The course will consist of assignments, lectures and a project work carried out during the course in study groups. Groups will present their project plans and the results. All students will give feedback and share ideas during the discussions. The project carried out during the course will be supported by lectures and discussions. The final mark comprises marks from continuous assessment, active participation to the group work and oral exam. Attendance to some parts of the course is compulsory. The course has limited enrollment for 18 students.

**Mode of delivery:**

Face to face and web based teaching

**Learning activities and teaching methods:**

12 h Lectures, 48 h practicals and group work, 9 h student presentations and discussions

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

BSc in biochemistry or a related subject, Protein Chemistry I or Protein production and analysis

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, presentations, oral exam

**Grading:**

1-5/fail

**Person responsible:**

Lari Lehtiö

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**744637S: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Caglar Elbuken

**Opintokohteen kielet:** English

**ECTS Credits:**

5 ECTS

**Language of instruction:**

English

**Timing:**

Autumn

**Learning outcomes:**

The students are expected to learn the fundamentals of micro/nanofluidics and be able to apply those concepts to several applications. Another major goal of the course is to give the students enough tools so that they can follow the state-of-the art developments in the field from the leading journals such as RSC Lab on a Chip, Wiley Small, ACS Analytical Chemistry. The students are also very briefly exposed to the recently growing field of nanofluidics through comparisons between micro and nano-scale physics. The students will be introduced with the biosensors and their operating principles.

**Contents:**

The goal of this course to cover the fundamentals and the latest developments in the field of micro /nanofluidics and their application areas in sensing and diagnostics. The first half of the course (modules 1-6 below) is intended to cover the fundamental fluidic concepts. The second half of the course (modules 7-12) covers the application areas of microfluidic and LOC systems, such as biosensors and point-of-care diagnostic devices. Finally, the trending topics in the field are covered.

For students interested in a hands-on experience, an extended module with multiple laboratory sessions is available (option-2). The lecture is a pre-requisite to take the laboratory practice session.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures + online exercises

**Target group:**

BSc and MSc level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

In-class quizzes, homework, term project, final exam

**Grading:**

1-5/fail

**Person responsible:**

Caglar Elbuken

**Working life cooperation:**

-

**Other information:**

Location of instruction: Kontinkangas campus

**488321S: Bioreactor technology, 5 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Process and Environmental Engineering**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Ville-Hermann Sotaniemi**Opintokohteen kielet:** English**Leikkaavuudet:**

488304S Bioreactor Technology 6.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

The course is held in autumn semester during period 2. It is recommended to complete the course in the 4th (1st Master's) year.

**Learning outcomes:**

After completing this course, the student will be able to verbally describe the most common equipment, materials and methods related to biotechnological processes, microbial growth and cultivation and sterilization. The student will be able to mathematically describe microbial growth and product formation, enzyme catalysis and bioreactor performance. The student will also be able to use these mathematical tools to plan and analyze bioprocesses.

**Contents:**

Biotechnological process: General process schemes, batch, fed-batch and continuous processes, biocatalysts and raw materials. Reactor design and instrumentation. Sterilization: kinetics of heat inactivation and practical implementation of sterilization methods. Mathematical description and quantification of the function of biocatalysts. Monod and Michaelis-Menten models, reaction rates and their determination. The lag phase of growth, cellular maintenance, cell death. Kinetics of product and by-product formation. Kinetics of oxygen and heat transfer. Oxygen and heat balances: significance and calculations. Mixing and power consumption. Scale-up and scale-down.

**Mode of delivery:**

Blended teaching.

**Learning activities and teaching methods:**

Lectures 40 h / exercises 4 h / homework 29 h / self-study 62 h.

**Target group:**

Master students in bioprocess engineering. Master students in process engineering, environmental engineering and biochemistry with required prerequisites.

**Prerequisites and co-requisites:**

The previous bachelor level courses in Process or Environmental Engineering (especially 488212A Fundamentals of Catalysis or 488309A Biocatalysis, 488052A Introduction to Bioproduct and Bioprocess Engineering) or respective knowledge.

**Recommended or required reading:**

Lectures: Lecture handouts; Doran, P. M. Bioprocess engineering principles. Academic Press. London, 2012. Supplementary material: Villadsen J., Nielsen J., Liden G. Bioreactor engineering principles. Springer Verlag, 2011. Shuler ML., Kargi F. Bioprocess engineering basic concepts. 2 ed. Pearson. 2002 and 2014.

**Assessment methods and criteria:**

Lectures, exercises, final exam, homework. Grade will be composed of final exam, exercises and homework.

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

DI Ville Sotaniemi

**Working life cooperation:**

No

**488305S: Advanced Course for Biotechnology, 5 op**

**Voimassaolo:** 01.08.2005 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Johanna Panula-Perälä

**Opintokohteen kielet:** English

**Leikkaavuudet:**

480450S Bioprocesses III 5.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

The course is held in spring semester during period 3. It is recommended to complete the course in the 4th (1st Master's) year.

**Learning outcomes:**

After completing this course, the student will be able to describe the most important techniques - both up- and downstream - in biotechnological production of proteins.

**Contents:**

Microbial homologous and heterologous protein production. Unit operations in product recovery and purification. Biocatalyst screening and optimization. Scale-up and intensification of bioprocesses.

**Mode of delivery:**

Blended teaching.

**Learning activities and teaching methods:**

Lectures 30 h / homework 48 h / self-study 57 h.

**Target group:**

Master students in bioprocess engineering. Master students in process engineering, environmental engineering and biochemistry with required prerequisites.

**Prerequisites and co-requisites:**

Courses 488212A Fundamentals of Catalysis or 488309A Biocatalysis, 488052A Introduction to Bioproduct and Bioprocess Engineering and 488321S Bioreactor technology, or respective knowledge.

**Recommended or required reading:**

Will be announced at the lectures.

**Assessment methods and criteria:**

Lectures, exercises and report. Grade will be composed of homework exercises and reports or final examination.

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

TKT Johanna Panula-Perälä

**Working life cooperation:**

No

**740079Y: Activities in University and Student Organizations, 1 - 10 op**

**Voimassaolo:** 01.01.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish, English

**ECTS Credits:**

1-10 ECTS

**Language of instruction:**

Finnish/English

**Timing:**

During academic studies

**Learning outcomes:**

Upon completion of the course, the student will be able to

- apply the skills needed in academic positions of trust (interaction skills, meeting techniques, working in a group, cooperation skills, leadership skills)
- evaluate critically the issues to be decided, take a stand on them and justify his or her viewpoint
- attend to the functions related to his or her position of trust in a responsible manner

**Contents:**

The course can include functions in a number of positions of trust as follows:

- Student Union Board, 1 year, 4-5 credits
- Student Union representatives, 2 years, 2 credits
- University Board of Directors, 1 year, 2 credits
- University Collegium, 2 years, 2 credits
- Education Council, 1 year, 2 credits
- Faculty Board, 2 years, 2 credits
- Board of a subject organization or a student guild, 1 year, 1-3 credits
- National student organization such as SYL, 1 year, 1-5 credits

- Other important functions in the field of education policy and/or development of teaching, such as Education Committee or section of the Student Union, 1-3 credits  
The number of credits to be awarded to the student is determined by the Dean of Education based on available documentation following the principles mentioned above.

**Mode of delivery:**

Independent work

**Learning activities and teaching methods:**

Independent report

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The student shall write a learning diary of the position(s) of trust that she or he has been managing, discussing the following issues:

1. Which organization has the student been working in, how long and how actively has s/he been taking part in its activities?
2. What does the student think s/he has learnt from the position of trust? (With special consideration of these working life skills: communication skills, social skills, technical skills, international competence, commercial and financial competence, development of self-knowledge)
3. How can the student make use of his or her experience in the future?
4. In the student's mind, how should the preparation of matters be developed?

The learning diary and proof of having been in charge of a position of trust are returned to the Chief Academic Officer of the Faculty who will determine the number of credits to be awarded. The length of the learning diary is 2 – 5 pages (font 11, line spacing 1).

**Grading:**

Pass/fail

**Person responsible:**

Dean of Education Tuomo Glumoff

**Working life cooperation:**

Active participation in student organizations and in University decision making develops generic working skills.

**Other information:**

The maximum number of credits for the activities mentioned above is 10 credits in one to two parts. The credits can be included in general studies

**ay724102P: Management and Organizations (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724102P Management and Organizations 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

Upon completion of the course, the student will be able to distinguish the concepts related to organization, organizing as well as managerial and entrepreneurial work. This understanding helps the student's ability to identify organizational processes in everyday work-life interventions and to list the possible change factors within a chosen organization. The student is also able to identify different kinds of organizations and can define the different principles of management styles. The student is able to understand various ongoing functions within organizations and their requirements for the organizations' management. The student understands the role of organizational development and learns to register the most essential challenges of management in the current organizations.

**Contents:**

The course covers the topics and questions of organizations and management, human organizing and processes as well as change management. The premises of the course are the traditional management schools of thought (scientific management, human relations school of thought, Hawthorne-studies, etc.) that the course goes through thoroughly. The course builds the newest questions of organizational theoretical approaches (change, processuality, etc.) on this understanding. In the course the students are introduced with the development of organizations and management, by presenting different organization types and management styles as well as the ways how those issues affect organization functioning.

**Mode of delivery:**

lectures, visiting lecturers, case-practices and group works.

**Learning activities and teaching methods:**

lectures (36 hours, including case-practices and group work of 9 hours), reading the course material (45 hours), preparation for the exam (52 hours).

**Recommended or required reading:**

Gareth Morgan (1997 tai uudempi). [Images of organization](#). London: Sage Publications.  
Hannele Seeck (2012 tai uudempi). [Johtamisopit Suomessa](#). Helsinki: Gaudeamus.  
Luentomateriaali.

**Assessment methods and criteria:**

Written exam of lectures and literature.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724105P: Management Accounting (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724105P Management Accounting 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work



**Language of instruction:**

Finnish

**Learning outcomes:**

After passing the course, the student knows the basic cost concepts and the elements of cost accounting systems. Students are also able to apply the basic cost information in the company's decision making and explain which costs should be included in these calculations under different circumstances.

**Contents:**

Theoretical framework for understanding cost accounting, cost concepts, cost recording, different product costing methods, cost-volume-profit analysis, using cost accounting information in decision making.

**Learning activities and teaching methods:**

20 h lectures, 16 h exercises and independent reading of study materials (97 hours).

**Target group:**

Major students in economics and business administration

**Recommended or required reading:**

[Drury, C.: Management and cost accounting, 7th or 8th ed. Cengage Learning EMEA. Chapters 1-11 \(8th ed.\);](#)

Supplementary material: [Järvenpää, M.- Lämsiluoto, A - Partanen, V. – Pellinen, J.: Talousohjaus ja kustannuslaskenta, WSOYpro, chapters 1-8.](#)

**Assessment methods and criteria:**

Lectures and literature examination.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Working life cooperation:**

Understanding of management accounting systems is typically an important part of work for graduates in economics and business administration and an essential part of occupations like management accountant or controller.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyo.fi/fi/kauppatieteiden-sivuaieopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724108P: Financial Markets (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724108P Financial Markets 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4

**Learning outcomes:**

The course is an introduction to the role and functions of financial markets and institutions. Upon successful completion of the course, the student will be able to describe the basic structure and

operational principles of financial markets and to identify different types of financial instruments and their characteristics.

**Contents:**

1) the role of financial markets and institutions in the economy, 2) main types of financial assets, their properties, and basics of pricing, 3) stock markets, bond markets, markets for bank obligations, treasury securities markets, derivative markets, mutual funds, private equity

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (26 h), visiting lectures (10 h), self-study (94 h), exam (3h)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

[Pilbeam: Finance & Financial Markets \(3<sup>rd</sup> edition\), Palgrave Macmillan](#)

Other material announced during the lectures

**Assessment methods and criteria:**

Examination, lecture diaries

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Prof. Juha-Pekka Kallunki

**Working life cooperation:**

General knowledge of the functions of financial markets and the various market participants

**Other information:**

The number of students is limited.

**555225P: Basics of industrial engineering and management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Elina Jääskä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555225P Basics of industrial engineering and management (OPEN UNI) 5.0 op

555221P Introduction to Production 2.0 op

555220P Basic Course in Industrial Engineering and Management 3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Period 1.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe what industrial engineering and management (or operations management) means
- explain the core concepts of business operations and utilise these concepts in describing and analysing operations of an organisation
- explain in general terms the factors that affect economic performance of organisations
- utilise the terminology used in industrial engineering and management (operations management), describe the financial processes of companies and based on this describe the use of cost accounting in organisational decision-making
- calculate unit costs in various simplified settings, calculate various alternatives, as well as perform planning and goal oriented calculations based on given data, and draw conclusions based on the calculation results

**Contents:**

Operations and productivity, operations strategy, forecasting, accounting and cost accounting, investments and financial planning, sustainability, capacity management, location decisions, layout strategies, human resources management, supply chain management, subcontracting, inventory management, production planning, MRP & ERP, production scheduling, Just-in-Time & Lean operations, maintenance.

**Mode of delivery:**

Web-based teaching 20 hours / practices 14 hours / Independent studying 100 hours.

**Learning activities and teaching methods:**

Web-based lectures 20 h / exercises 14 h / self-study 100 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555285A Project management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture and exercise materials. Heizer, J. & Render, B. (2014) Operations management: sustainability and supply chain management, 11th ed. Pearson. In addition, recommended materials include Martinsuo, M. et al. (2016) Teollisuustalous kehittyvässä liiketoiminnassa chapters 7-9, 16 and 26.

**Assessment methods and criteria:**

This course utilises continuous assessment. During the course, there are seven mandatory weekly assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

MSc (Tech.) Elina Jääskä

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555220P Basic Course in Industrial Engineering and Management 3 ECTS cr and 555221P Introduction to Production 2 ECTS cr.

**555285A: Project management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555288A	Project Management	5.0 op
ay555285A	Project management (OPEN UNI)	5.0 op
555282A	Project Management	4.0 op
555280P	Basic Course of Project Management	2.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. Check the course in English 555288A Project Management.

**Timing:**

Period 2.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe explain the essential concepts and methods related to project management
- apply project management methods to create a schedule for a project and calculate critical path
- understand essential concepts related to project cost management and able to apply earned value method and three point estimate to manage project costs
- recognises the essential tasks of project risk management

**Contents:**

Defining project management, project goals and objectives, project phases and project life-cycle management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management, project stakeholder management, project communications management, the role of project manager, new modes of project delivery

**Mode of delivery:**

The tuition will be implemented as web-based teaching.

**Learning activities and teaching methods:**

Web-based lectures 16h, self-study 118h

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture material, exercise book, Artto, Martinsuo & Kujala 2006. Projekttiliiketoiminta. WSOY

**Assessment methods and criteria:**

Weekly assignments and final online exam

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Assistant professor Kirsi Aaltonen

**Working life cooperation:**

Videos from the industry's projects

**Other information:**

Substitutes courses 555280P Basic Course of Project Management + 555282A Project Management.

**555242A: Product development, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Haapasalo, Harri Jouni Olavi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay555242A	Product development (OPEN UNI)	5.0 op
555240A	Basic Course in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

English.

**Timing:**

Periods 1-2.

**Learning outcomes:**

This course introduces product development and innovations management in a company environment. The course provides fundamental understanding over tools and frameworks that can be used for analysing and managing products, innovations, and technology development. The aim is to create a connection between product development and other company functions. Upon completion of the course, the student will be able to

- explain the role of product development as a company function
- understand the difference between innovation activities and systematic product development, and knows the difference between different phases of product development process and its activities
- transform customer needs into requirements for product development process and finally into product features
- define the meaning of other company functions to product development activities

**Contents:**

Meaning of products for the operations of an industrial enterprise, product development paradigm and defining relevant concepts, realising product development methodologically (U&E model, Cooper's stage-gate model, QFD), managing innovations, and product development success factors.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching.

**Learning activities and teaching methods:**

Lectures 20 h / exercises 6 h / group work and self-study 108 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

555226A Operations and supply chain management (Operations and production)

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Handouts, course work, and a collection of articles. Ulrich, K. & Eppinger, S. (2008) Product Design and Development. McGraw-Hill. 358 p.

**Assessment methods and criteria:**

Exam and group work.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Professor Harri Haapasalo.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555240A Basic Course in Product Development.

**ay724110P: Introductory Economics (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724110P Introductory Economics 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

Period A. It is recommended that students complete the course during the first autumn semester.

**Learning outcomes:**

After completing the course students (i) understand the basic concepts of economics and the rudiments of economic theory, (ii) can explain the determination of resource allocation and prices in a market economy, (iii) know how the aggregate economy operates in the short and long run, and (iv) how economic policy affects the Finnish economy and also the European economy.

**Contents:**

The course introduces students to the tools and ideas economics uses to describe and explain economic phenomena. The topics include:

- the long-term development of the Finnish and World economy

- basic ideas and principles of economics
- opportunity cost and comparative advantage
- market equilibrium: demand and supply
- how well does market economy work?
- firms and competition in market economy
- aggregate economic activity and its measurement
- business cycles
- monetary and fiscal policy
- economic growth

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

36 lectures including problem sets. Students are expected to do the problem sets on their own and familiarize themselves with the required and recommended materials (93 h). Mid-term exams (2) or Final exam (3 h).

**Target group:**

Sivuaineopiskelijat ja avoimen yliopiston opiskelijat

**Recommended or required reading:**

Material posted at the webpage.

Textbook: [Acemoglu, D., Laibson D. and List, J.A., Economics, 2015](#)

and extra readings: [Timothy Taylor, The Instant Economist. Everything You Need to Know About How the Economy Works. 2012. A Plume Book \(Penguin\), New York NY.](#)

Robert P. Murphy, Lessons for the Young Economist. Ludvig von Mises Institute 2010; [http://mises.org/books/lessons\\_for\\_the\\_young\\_economist\\_murphy.pdf](http://mises.org/books/lessons_for_the_young_economist_murphy.pdf)

**Assessment methods and criteria:**

Final Exam.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Marko Korhonen

**Working life cooperation:**

Students learn relevant and useful facts about the operation of the markets, and the aggregate economy to an extent that they can reasonably utilize those facts and knowledge in the decision making of the business they are working at.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724111P Finnish Economy and Economic Policy 5.0 op

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After the course the student is capable of outlining the economic history of Finland, to describe the position of Finland in the global economy and to evaluate the challenges of the Finnish economy now and the future. In addition, the student can describe the main features of the different areas in the Finnish economy.

**Contents:**

The course provides an overview of the Finnish economy and economic history, its current state and future development. The course deals with the activities of the Finnish economy and development, such as globalization, regional economy and general economic policy.

Lectures will include the following themes

1. The Finnish economy from the late 1800s to the early 2000s
2. Productivity and economic growth
3. Globalisation and Finland
4. Regional development and regional policy in Finland
5. Fiscal policy
6. Public economics and challenges of welfare state
7. Finance and economic development in communes
8. Innovations and innovation policy

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures, reading the course literature (93 h) and exam (4 h).

**Recommended or required reading:**

Announced by the lecturer.

**Assessment methods and criteria:**

Lecture- and literature examination and course assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppsy.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**555264P: Managing well-being and quality of working life, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Arto Reiman

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555264P	Managing well-being and quality of working life (OPEN UNI)	5.0 op
555261A	Basic Course in Occupational Psychology	3.0 op
555262A	Usability and Safety in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Periods 3-4.

**Learning outcomes:**



Upon completion of the course, the student will be able to:

- set targets and choose appropriate methods of developing well-being at work both at personal and organizational levels
- develop well-being at work in the contexts of labor legislation, good practices, productivity, occupational safety expertise, management and human resources
- know the key sources of information, typical goal-setting and management practices and the methods for assessing the performance at individual and organizational levels
- assess the economic impacts of well-being at work, especially in cases of work ability, occupational health, job satisfaction, occupational safety, productivity and the overall quality of working life
- know essential national and international regulation and strategic goal setting practices, good practices of the case companies, current trends, and methods in research.

**Contents:**

The course gives the student a vision of building sustainable, productive and satisfactory career. The contents cover the whole area of basic quality issues of working life analysing them in the following framework "Well-being at work means safe, healthy, and productive work in a well-led organisation by competent workers and work communities who see their job as meaningful and rewarding, and see work as a factor that supports their life management".

**Mode of delivery:**

The tuition will be implemented as blended teaching (web-based teaching and face-to-face teaching).

**Learning activities and teaching methods:**

Lectures 10 h / self-study 70 h / group work & exercises 42 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial Engineering and Management that also includes 555225P Basics of industrial engineering and management, 555285P Project Management, 555242A Product development, and 555286A Process and quality management.

**Recommended or required reading:**

Applicable parts of Arnold, J. et al. (2010), Work Psychology; Understanding Human Behaviour in the Workplace. 5th Edition. Financial Times/Prentice Hall and Aura, O. & Ahonen, G. Strate-gisen hyvinvoinnin johtaminen, Alma Talent. Other literature will be informed during the course.

**Assessment methods and criteria:**

This course utilises continuous assessment including exercises during the lectures (weight 20 %), group work (weight 40 %) and examination (weight 40 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr. Arto Reiman

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555261A Basic Course in Occupational Psychology + 555262A Usability and Safety in Product Development.

**555286A: Process and quality management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Osmo Kauppila

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555286A Process and quality management (OPEN UNI) 5.0 op

555281A Basic Course of Quality Management 5.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish.

**Timing:**

Period 4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- explain the role of process and quality management in a business organisation
- develop business processes based on the principles of quality management and appropriate tool

**Contents:**

Foundations of total quality management, planning of quality, performance measurement, process management, people management in relation to quality management, implantation of total quality management.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching (integrated classroom lectures and exercises).

**Learning activities and teaching methods:**

20 h lectures, 114 h independent study

**Target group:**

Industrial Engineering and Management students and other students studying Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555242A Product development, and 555264P Managing well-being and quality of working life.

**Recommended or required reading:**

Oakland, J.S. (2014) Total quality management and operational excellence (4th ed.). Routledge, 529 pp. and material handed out during the course.

**Assessment methods and criteria:**

To pass the course, the student must pass the weekly course exercises (50 % of the course grade) and an exam (50 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Osmo Kauppila.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555281A Basic Course of Quality Management.

**724811P: Entrepreneurship for Sustainability, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Oulu Business School**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Anne Keränen**Opintokohteen kielet:** English**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 2

**Learning outcomes:**

After the course the students should:

Understand the roles of entrepreneurship in creating socially responsible change in society, know how to map and analyze alternative sustainable entrepreneurial business ideas based on individual strengths, values and the UN SDGs, know creative problem solving assessment methods, know how to communicate about entrepreneurial ideas.

**Contents:**

Course description

The course outlines interdisciplinary skills and knowledge that foster the creation of a sustainable entrepreneurial mindset. These skills include problem solving, creativity, networking, communications, risk-taking and adaptability. Entrepreneurship is approached through its different forms and roles in various contexts of society, ecosystems, and businesses. The focus is on entrepreneurial mindsets, responsible business and what entrepreneurship requires from individuals and teams, especially from the "me/us as entrepreneur" standpoint. During the course students familiarize themselves with the role of business and entrepreneurship in building sustainable societies. In addition, students have the opportunity to present their sustainable business ideas to responsible business experts.

Course objectives

Students develop skills for creative problem solving; students understand that entrepreneurial behavior can take place within many contexts (new ventures, associations, government agencies, and existing businesses); students identify their alternative roles, opportunities, and viewpoints regarding entrepreneurial choices they can make; students strengthen their skills of responsible business and are able to assess choices for business as promotor of social change based on the UN Sustainable Development Goals; students are able to define and assess alternative contexts for entrepreneurial action and to create and assess alternative business scenarios for their future; students are able to recognize and analyze business opportunities and social/customer problems and challenges; students are able to create and evaluate alternative solutions to the identified opportunities, problems, and challenges of responsible business; students are able to communicate effectively about their entrepreneurial ideas.

**Mode of delivery:**

Lectures, workshops and online learning

**Learning activities and teaching methods:**

Learning takes place mostly in groups by means of intensive lectures and workshops, visitor presentations and discussions, both in class and via online learning platform. The course includes 36 contact hours. Reading the course literature (20 h), Groupwork (80 h) and learning diary report (35 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Further details will be provided by the responsible persons in the first session.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Anne Keränen and Jan Hermes

**Working life cooperation:**

The course incorporates real life case examples and meetings with sustainable entrepreneurship practitioners and experts. Students learn interdisciplinary skills that can be applied in real working life.

**Other information:**

The number of students is limited.

**724812P: Building Change Through Entrepreneurship, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ahmad Arslan

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay724812P Building Change Through Entrepreneurship (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 3

**Learning outcomes:**

After the course completion, the students should:

1. Have the basic knowledge about start-ups and new business creation
2. Have the ability to find and utilize information for new business creation
3. Have the knowledge how to analyze own business-case
4. Have the knowledge how the to plan a new start-up
5. Have the ability to present own business-case

**Contents:**

Lectures will focus on the following themes:

Introduction to Entrepreneurship

Recognizing Opportunities and Generating Ideas

Feasibility Analysis

Industry and Competitor Analysis

Developing an Effective Business Model

Building a New Venture Team

Assessing New Venture's Financial Strength and Viability

Writing a Business Plan

Getting Finance or Funding  
 Preparing for and Evaluating Challenges of Growth

**Mode of delivery:**

Face-to-face teaching complemented with online resources

**Learning activities and teaching methods:**

The course consists of lectures and workshops (32 h), preparation for lectures and workshops (18 h), and, reading the literature and preparation for assignments (50 h), and writing the assignments (40 h).

**Target group:**

B.Sc. and M.Sc. students from different faculties in the university as well as exchange students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

None

**Recommended or required reading:**

- Bruce R. Barringer and R. Duane Ireland (2006). Entrepreneurship: Successfully Launching New Ventures. Pearson Education.
- Slides and relevant online resources

**Assessment methods and criteria:**

Individually written assignments. Completion of 10 assignments correspond to revving grade 5, while minimum two are needed to get 1 in order to pass the course

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Ahmad Arslan and Anne Keränen

**Working life cooperation:**

Practical insights to new business creation tested through several assignments addressing different aspects associated with it.

**Other information:**

The student number is limited to 50.

**724813P: Entrepreneurship in Action, 5 op**

**Voimassaolo:** 01.08.2017 - 31.12.2020

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Niina Karvinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Periods 1-4

**Learning outcomes:**

Upon completion of the course, the students can apply the core competencies of his/her studies in a real-life entrepreneurship context. Students can realize and start working with a business opportunity or social problem in practice to find a solution. The student will improve his/her entrepreneurial skills; multicultural group working, problem solving, communicating and presenting.

**Contents:**

In these studies students generally co-operate in workshops where they learn practical methods of entrepreneurship like business model creation and validation processes, lean methodology, marketing, branding, basic financial management and presenting ideas e.g. pitching.

**Mode of delivery:**

Face-to-face teaching and coaching.

**Learning activities and teaching methods:**

Bootcamps, workshops, group work, individual guidance. Most of the exercises are completed as group work (132 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Programme specific assessment that may include both group and individual assessment methods.

**Grading:**

The course utilizes grading scale "pass/fail"

**Person responsible:**

Niina Karvinen ja Anne Keränen

**Working life cooperation:**

The programs of this course are run in close co-operation with relevant business partners or applied to practice. Students also learn practical entrepreneurship skills.

**Other information:**

The number of students is limited

**724814P: Introduction to Business Development, 5 op**

**Voimassaolo:** 01.08.2017 - 31.07.2021

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Antti Muhos

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 1

**Learning outcomes:**

Students are familiar with basic business concepts and theories in SME context. On successful completion of the course, students understand the business development process from opportunity recognition to a launch and development of a sustainable business. The students are able to identify basic business processes in practice.

**Contents:**

The course focuses on the basic concepts of SME business management and development including opportunity recognition, experimentation and testing of a new business idea, strategy, business model development and business planning, financing and planning and management of growth and change.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Face-to-face teaching including lectures, guest lectures, company visit/s and variable action-based learning methods (36h). Individual assignment (20h) and reading of course materials (76 h).

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Selected readings from e.g.: Spinelli & Adams. 2012, 2016. New Venture Creation: Entrepreneurship for the 21st Century. McGraw-Hill, New York. Allen, K. 2012. New venture creation. South-Western. Moreover, additional materials are provided during the course.

**Assessment methods and criteria:**

Learning diary, group assignment/s

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Matti Muhos

**Working life cooperation:**

This course is designed as an integral part of entrepreneurship studies. This course will include real life case studies of established and emerging businesses by company visits.

**Other information:**

The number of students is limited

**724815P: Entrepreneurial Assignment, 5 op**

**Voimassaolo:** 01.06.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Sari Perätalo

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

The schedule for the course is dependent on the entrepreneurial event or training in which student takes part in.

**Learning outcomes:**

Upon completion of the course the students are familiarized with entrepreneurial activity in society and possess skills that help to solve entrepreneurial problems and make change. Students will have an insight into the diversity of entrepreneurship and gain understanding of the specific aspects of entrepreneurship.

**Contents:**

Studies are tailored upon acceptance by the course instructor. The course consists of two parts: practice, and theory. Students compile the course through participating in different entrepreneurship supporting activities. The students can for example participate in Tellus boot camps, events or volunteering program. In addition, students can include activities organized by other stakeholders (e.g. faculties, public organizations or third sector organizations). In addition, the students reflect their learning in a report.

**Mode of delivery:**

Face-to-face teaching including entrepreneurial project, event, workshop, etc. Individual written assignment and reading the agreed materials.

**Learning activities and teaching methods:**

Individual and group work (132h). Teaching methods vary depending on the entrepreneurial project, event, workshop, etc. a student has participated in.

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course.

**Assessment methods and criteria:**

Assessment is based on an individual report that a student is expected to deliver after participating in an entrepreneurship-related event, workshop, project, etc.

**Grading:**

The course utilizes verbal grading scale "pass/fail".

**Person responsible:**

Sari Perätalo

**Working life cooperation:**

The course allows the students to gain first-hand entrepreneurial experience in various forms.

**Other information:**

Contact the responsible teacher to enroll in the course.

**724816P: Building Business Through Creativity and Collaboration, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**



5 credits

**Language of instruction:**

English

**Timing:**

Period 4

**Learning outcomes:**

During the course the student will explore entrepreneurship from the perspective of an artistic process and learn the process of designing improbable solutions. The students are challenged to question mainstream values, assumptions taken for granted, and ways of doing things. The course gives the student tools that are needed in developing improbable business models and solutions that can shift paradigms.

During the intensive workshops of the course, the student will work in teams and learn to regulate emotions, such as uncertainty, frustration, enthusiasm, and joy.

Upon completion of the course, the student will:

- develop entrepreneurial leadership
- increase abilities to build new inspiring visions
- master agile methods of creation to deal with uncertainty and risks
- learn how to use diversity and improbable encounters to develop business
- connect passion and convictions with a project which creates value
- leverage failure to increase creativity and resilience

**Contents:**

Entrepreneurs develop activities that aim to challenge the status quo, break rules and subvert systems. Furthermore conflicts, emotional strains and uncertainties are often part of entrepreneurship. But how can such things be taught/learned?

The course introduces Art Thinking, an agile method to create improbable outcomes with certainty. The method enables out-of-the-box thinking and creative productions where encounters of all sorts are key resources. Instead of writing business plans, the participants create during the Improbable workshops artistic prototypes and organize an art exhibition.

During the Improbable workshops students will be taught the Art-Thinking Method which involves 6 main activities. The students will:

- (1) engage in gift-giving practices which foster new and unusual partnerships (Donate);
- (2) "steal" from others to create unique propositions (Deviation);
- (3) follow a journey without a clear goal but which will eventually make a lot of sense (Drift);
- (4) challenge existing rules and values as well as their taken-for-granted assumptions (Destruction);
- (5) accept criticism to learn from others (Dialogue), and
- (6) exhibit their work to get feedback and find new partners (Display).

**Mode of delivery:**

Face-to-face sessions and workshops

**Learning activities and teaching methods:**

Participation in the workshops. Producing a piece of art and presenting it at an art exhibition together with others. Completion of the group work and individual tasks, such as reading course materials and reflecting the learning experiences.

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course

**Assessment methods and criteria:**

Compulsory participation and commitment to the teamwork. Assessment of the course tasks.

**Grading:**

The course utilizes verbal grading scale "pass/fail"

**Person responsible:**

Mia Kemppaala, Anne Keränen

**Working life cooperation:**

Students learn practical entrepreneurial skills through artistic process.

**Other information:**

The number of students is limited

**H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Advanced Studies**Laji:** Study module**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

**746601S: Advanced studies in biochemistry in other universities, 0 - 75 op****Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** Finnish**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op****Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746609M: Studies in other universities/institutes, 0 - 50 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Other Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

## **H325422: Compulsory courses - MSc, Protein science and biotechnology, 77 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

### *Compulsory courses*

#### **744635S: Protein production and analysis I, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

#### **ECTS Credits:**

5 credits

#### **Language of instruction:**

English

#### **Timing:**

M.Sc. yr1 autumn

#### **Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

#### **Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

#### **Mode of delivery:**

Face to face teaching

#### **Learning activities and teaching methods:**

42 contact hours (includes 8 hours of problem solving classes plus other exercises)

#### **Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

BSc in biochemistry or a closely related subject

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (problem solving exercises)

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**744627S: Molecular biology II, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Elitsa Dimova

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744621S Molecular biology II 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

After the course students are able to:

- describe the general features of DNA manipulating enzymes and CRISPR-Cas9
- design (on paper or in silico) oligonucleotides for PCR amplification
- design and set up restriction digests and ligation reactions in order to carry out basic and advanced cloning procedures
- analyze experimental results from basic cloning procedure
- use basic datasets and basic online bioinformatics tools for genetic engineering

**Contents:**

This module provides a "real-life" approach to practical molecular biology, including DNA cloning strategies, site directed mutagenesis, generation of transgenic mice, etc. It comprises concept overview lectures, complex problem solving based exercises and includes written reports and student presentations. Attendance of the course is required.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

18 h seminars, plus student presentations

**Target group:**

Major students

**Prerequisites and co-requisites:**

The course is designed for MSc students familiar with DNA organization, gene structure & genetic concepts (ORF, codon, heterologous and homologous recombination).

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

This course utilizes continuous assessment based on problem solving based exercises, written reports, student presentation, and crossword solutions. All tasks should be passes by minimum of 60%. Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Elitsa Dimova

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**747616S: Biochemical methodologies II, 10 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ulrich Bergmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747608S Biochemical methodologies II 8.0 op

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

MSc 1st spring

**Learning outcomes:**

Upon successful completion students are able to:

- describe the theoretical basis of the main biochemical analysis methods for proteins
- use the different instruments
- describe the potential of the different analytical techniques and develop strategies for addressing specific questions in protein & proteome-analysis
- integrate data from multiple sources and evaluate it critically

**Contents:**

During this module students will analyze their own protein samples. The course will cover principles and practical applications of some of the more advanced methodologies used in practical biochemistry, including chromatography, fluorescence spectroscopy, stopped flow analysis of enzymatic reactions, circular dichroism, surface plasmon resonance, micro-calorimetry, mass spectrometry, and proteomics based on 2D electrophoresis and LCMS. For assesement each student has to write four research reports

in the style of a scientific publication. Attendance is compulsory. The course has limited enrollment for 22 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

120 h lab., including pre-lab lectures plus exercises. For laboratory period a personal time table will be created for every student. Each student will spent about 1 full day and 5 half day's slots in the lab, plus one week proteomics lab with workload from 2h to full day.

**Target group:**

Obligatory for M.Sc. in Protein Science and biotechnology

**Prerequisites and co-requisites:**

Protein production and analysis I (744635S) and Protein production and analysis II (744636S) OR Protein chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Four reports written in style of a scientific publication  
Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Ulrich Bergmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744628S: Orientation to research work, 0 - 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744617S Orientation to research work 0.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to research work via the active integration of students into research groups and/or via one to two week advanced practical courses. The integration into groups can be either full-time or part-time research work, with 5op being awarded for each three full-time weeks equivalent worked. The research groups do not need to be in the Faculty of Biochemistry and Molecular Medicine, University of Oulu, but advance permission should be sought if the research group is not part of the University of Oulu.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744628S and 744626S (Orientation to biochemical work) must be 10-20 credits.

**744629S: Orientation to biochemical work, 0 - 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744624S Orientation to biochemical work 0.0 op

**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to non-research work in companies or other suitable environment. The work can be either full-time or part-time work, with 5op being awarded for each three full-time weeks equivalent worked. Each placement must be agreed in advance with the responsible person.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744629S and 744628S (Orientation to research work) must be 10-20 credits.

**744636S: Protein production and analysis II, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English



**Timing:**

M.Sc. yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 contact hours +80 hours of lab

**Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

PPA I or equivalent. This course cannot be taken by people who have done Protein Chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744691S: MSc thesis (Pro gradu), 30 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Diploma thesis

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**ECTS Credits:**

30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis work students have:

- increased appreciation of how research leads to knowledge and developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management
- developed skills in retrieving, critically appraising and integrating information as well as skills in communicating science and making and defending scientific arguments

**Contents:**

This module provides an extensive 3 month project in a research group as well as a written MSc thesis. The experimental work can be started after 30 cp of Masters studies have been completed, but it is recommended that the MSc thesis work is the final module taken in the MSc. Students are responsible for finding a suitable research group in academia or in industry in which they wish to undertake the MSc thesis work. The work may be undertaken in the research groups of the Faculty of Biochemistry and Molecular Medicine or in any other suitable research group in Finland or abroad. Students should produce a short (typically 2 page) study plan detailing the proposed content of their MSc thesis work, supervisor(s), location of the research work and start date. This should be produced at least 2 weeks before the proposed start date and must be approved before they start work. The MSc thesis is based only on the work done during the first 3 months of work (plus a possible extension of 5-20cp, see 744692 MSc thesis, additional experimental work) by the student on the project, except in cases of mitigating circumstances. The MSc thesis (typically 50-60 pages long) is based on the experimental work undertaken by the student and the contextualization of the research and the results based on published literature in the field. For detailed instructions see <http://www oulu.fi/fbmm> The thesis must be submitted within 1 year of the start date, except in cases of mitigating circumstances.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

At least 30cp of MSc level studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**Written thesis. Read more about assessment criteria at <http://www oulu.fi/fbmm>**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

-

**744692S: MSc thesis, additional experimental work, 0 - 30 op****Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**ECTS Credits:**

5-30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis additional experimental work students have:

- increased appreciation of how research leads to knowledge
- developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management

**Contents:**

This module provides additional experimental time for the MSc thesis work in 5cp blocks. Students should carefully consider the balance between the time required for the experimental part of the MSc thesis based on the topic chosen versus the benefits of additional courses in biochemistry, ancillary subjects or a minor in another subject. If additional experimental work is planned before the start of the thesis this should be indicated on the study plan (see 747691S MSc thesis). If there are proposed changes to the length of the experimental work during the MSc thesis the responsible person should be notified.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

747691S MSc thesis is a co-requisite

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Experimental work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

-

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

0 credits

**Language of instruction:**

Finnish / English

**Timing:**

M.Sc. yr2

**Learning outcomes:**

-

**Contents:**

Will be written in context to MSc thesis. In the test student must show a good command of both language skills and their field of MSc thesis. If student's native language is not Finnish or Swedish Faculty of Biochemistry and Molecular Medicine will define language in the test.

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written abstract of MSc thesis

**Grading:**

pass/fail

**Working life cooperation:**

No

**Other information:**

-

### **H325425: Optional specialist courses - MSc / Int MSc, Protein science and biotechnology, 11,5 - 21,5 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Optional specialist courses (a minimum of 3 of these courses must be taken)*

**747613S: In silico methodologies in biochemistry and molecular medicine, 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** André Juffer**Opintokohteen kielet:** English**Leikkaavuudet:**

747603S	Bioinformatics	2.5 op
747604S	Introduction to biocomputing	3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

After a successful completion of this course, students will have

- Obtained an appreciation of the quantitative aspects of analyzing scientific (big) data either stored in large data databases or generated by sophisticated modeling and simulation tools.
- Gained a basic understanding of applying various bioinformatics methods to large biological data sets.
- Realized the potential of scientific computing for the study of the behavior of biological systems, in particular large biological macromolecules.

**Contents:**

This course aims at emphasizing the quantitative aspects of scientific research. For this, the course contains three intertwined components: (i) searching and evaluating nucleic acid and protein structural data from various databases, (ii) use of scientific computing to study structural, dynamical, functional and thermodynamical properties of proteins and membranes and their interaction with other molecules, and (iii) using biocomputing tools to access and analyze large and high-throughput data produced and accessible through biochemical and computational experiments.

Students will learn to access biological databases, search and retrieve relevant data, analyze data in a meaningful manner, and link data and results obtained from different tools. A very brief introduction to metabases and data compilation is provided as well. Interaction studies are emphasized through genome-wide mapping of protein-DNA interaction, proteomics-based bioinformatics, and high-throughput mapping of protein-protein interaction networks. Commonly employed modeling and simulation techniques will also be dealt with. These include molecular dynamics, Monte Carlo and Langevin (stochastic, Brownian) dynamics, continuum electrostatics, statistical thermodynamics, protein modeling techniques, protein-ligand docking, protein-ligand affinity calculations and the computer simulation of the protein folding process and enzyme action.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

74 h contact sessions. Lectures and practicals, student tasks, including the presentation of an original article. Attendance to practicals and article presentation are mandatory.

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Books, articles:

1. Big data in biomedicine (<http://www.nature.com/nature/outlook/big-data/>)
2. Holzinger, A. Biomedical informatics, Springer, Heidelberg, 2014.
3. PubMed (Publications) (<http://www.ncbi.nlm.nih.gov/pubmed/>)
4. Leach, A.R., Molecular modelling. Principles and applications, Second edition, Prentice Hall, New York, 2001
5. Berendsen, H.J.C Simulating the physical world. Hierarchical modeling from quantum mechanics to fluid dynamics., Cambridge University Press, Cambridge, 2007

Useful databases:

1. GenBank (DNA) (<http://www.ncbi.nlm.nih.gov/nucleotide>)
2. Ensembl and Ensembl Genomes (Genome) (<http://www.ensembl.org/> and <http://ensemblgenomes.org/>)
3. UniProt (Protein) (<http://www.uniprot.org/>)
4. DIP and BioGrid (Protein Interaction) (<http://dip.doe-mbi.ucla.edu/dip/Main.cgi> and <http://thebiogrid.org/>)
5. PDB (protein structure database) (<http://www.rcsb.org/>)
6. Entrez (<http://www.ncbi.nlm.nih.gov/gquery/gquery.fcgi>)

**Assessment methods and criteria:**

Practicals evaluation, article presentation, group discussion, and project report. No exam.

**Grading:**

pass/fail

**Person responsible:**

André H. Juffer

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**747614S: Macromolecular X-ray crystallography, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lari Lehtiö, Wierenga Rikkert

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747605S Basic aspects of protein crystallographic methods 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

After completion of this course students are able to:

- Discuss the key aspects of protein crystallization methods and interpret the results
- Describe the diffraction of X-rays and the importance of crystal symmetry
- Describe the importance of the Fourier transform method in the structure determination
- Describe the phase problem and tell the methods to solve it
- Apply knowledge on protein chemistry to refinement of a crystal structure
- Judge the quality of a protein structure

**Contents:**

The course will describe the principles of X-ray diffraction theory and practice. It includes a hands on project done throughout the course on protein crystallization, data collection, solving and refinement of the protein structure and validation of the model. Following topics will be covered during the lectures and practicals: crystallisation theory, symmetry of crystals, handling of crystals, data collection, diffraction pattern and the reciprocal lattice, the phase problem, molecular replacement, isomorphous and anomalous differences, structure refinement and validation. Attendance to the lectures and exercises is compulsory. The course has limited enrollment for 18 students

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

35 h lectures, 52 h exercises, project work and a research report

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

Protein chemistry I or Protein production and analysis or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

Rupp, B: Biomolecular Crystallography: Principles, Practice and Application to Structural Biology

Blow, D: Outline of Crystallography for Biologists (eBook available)

Drenth, J: Principles of Protein X-Ray Crystallography

**Assessment methods and criteria:**

Continuous assessment, research report, no exam.

**Grading:**

pass/fail

**Person responsible:**

Lari Lehtiö and Rikkert Wierenga

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**747615S: Introduction to structure-based drug discovery, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lari Lehtiö

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747612S Introduction to structure-based drug discovery 4.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

After completion of this course student should be able to:

- Find and analyze a protein structure of interest from databases from the point of view of drug discovery
- Critically assess a quality of an experimental protein-small molecule complex structure
- Discuss the process of creating a virtual small molecule library
- Describe the commonly used computational methods for screening of small molecule libraries against a protein target
- Critically judge the results of the computational screening

**Contents:**

The course will consist of assignments, lectures and a project work carried out during the course in study groups. Groups will present their project plans and the results. All students will give feedback and share ideas during the discussions. The project carried out during the course will be supported by lectures and discussions. The final mark comprises marks from continuous assessment, active participation to the group work and oral exam. Attendance to some parts of the course is compulsory. The course has limited enrollment for 18 students.

**Mode of delivery:**

Face to face and web based teaching

**Learning activities and teaching methods:**

12 h Lectures, 48 h practicals and group work, 9 h student presentations and discussions

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

BSc in biochemistry or a related subject, Protein Chemistry I or Protein production and analysis

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, presentations, oral exam

**Grading:**

1-5/fail

**Person responsible:**

Lari Lehtiö

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**747617S: Biochemistry and biotechnology of protein folding, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747611S Biochemistry of protein folding 3.0 op

**ECTS Credits:**



5 credits

**Language of instruction:**

English

**Timing:**

M.Sc., yr1-yr2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- present and discuss issues presented in the primary literature on a variety of aspects of protein folding.
- display an understanding of the theoretical and practical implications of in vivo, in vitro and in silico studies on protein folding and the integration of results.
- demonstrate the ability to interpret a wide range of data from multiple sources, to critically evaluate and contextualize this data and to solve problems relating to interpretation.

**Contents:**

This module provides an introduction to protein folding in vivo and in vitro. Topics covered include protein folding and quality control in the endoplasmic reticulum, mechanisms regulating protein folding including the unfolded protein response, the catalysis of native disulphide bond formation, the biochemistry of molecular chaperones and the role of molecular chaperones and protein folding catalysts in other cellular events. The application of this knowledge to biotechnology will also be discussed.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 contact hours of lectures and seminars

**Target group:**

M.Sc. in Protein science and biotechnology and exchange students

**Prerequisites and co-requisites:**

Protein chemistry I (740364A) or Protein production and analysis (747618S) or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The module is assessed based on reports prepared on individual topics and on participation in the seminars. Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744634S: Introduction to big data analysis and bioinformatics models, 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Valerio Izzi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744640S	Data mining and data-based models	5.0 op
740393A	Data mining and data-based models	5.0 op

**ECTS Credits:**

5 cr

**Language of instruction:**

English

**Timing:**

Spring

**Learning outcomes:**

Upon completion the student should be able to:

- Identify, retrieve and contextualize knowledge from major online biomedical sources
- Identify, retrieve and analyze big biomedical data using open access resources and responsive databases
- Develop investigational pipelines for biomedical hypothesis and researches using available open data

**Contents:**

General principles of data identification, mining and analysis. Textual and contextual data evaluation. Repositories and databases of biomedical interest. Data analysis using open-access online tools, with examples from clinical and molecular studies. Machine learning. Multi-Omics integration. Contents may vary.

**Mode of delivery:**

Face to face teaching and online

**Learning activities and teaching methods:**

12 h lectures + online exercises

**Target group:**

MSc / Molecular medicine or Protein science and biotechnology

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Evaluation of assignment completion online

**Grading:**

pass/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

## **H325428: Optional courses - MSc, Protein science and biotechnology, 1,5 - 31,5 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

**902154Y: Scientific Communication for Biochemists, 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Language and Communication Studies**Laji:** Course**Vastuuyksikkö:** Languages and Communication**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Susan McAnsh**Opintokohteen kielet:** English**Leikkaavuudet:**

902101Y English for Biochemists 2 3.0 op

**Proficiency level:**[C1](#) on the CEFR scale**Status:**

Optional but highly recommended for 4th-year students in BSc-MSc degree programme and for students in International MSc programmes (Protein Science and Biotechnology; Molecular Biology with a Double MSc Degree)

**Required proficiency level:**

A minimum level of B2 (CEFR) is needed at the start of the course.

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. year 1 spring term

**Learning outcomes:**

By the end of the course, students will have demonstrated an ability to

1. write a research article that follows the main discourse conventions of biochemistry,
2. prepare and deliver an oral, scientific conference or teaching presentation supported by an effective slideshow,
3. apply the rules of referencing,
4. use a sufficient range of appropriate academic vocabulary relevant to their discipline,
5. report their work orally or in writing with accuracy and in an appropriate academic style,
6. structure their work for optimal clarity and impact,
7. make good use of feedback from peers and teachers to improve their own scientific production.

**Contents:**

This course will cover presentation skills (2 ECTS credits) and scientific research writing (3 ECTS credits). The course aims to help students acquire understanding of the conventions and expectations of the academic community of biochemists for scientific reporting, and develop presentation and writing skills for their future professional life.

**Mode of delivery:**

Contact teaching (lessons/lectures and tutorials), web-supported independent study

**Learning activities and teaching methods:**

Writing module: Lectures 12 hours, independent work alone and in pairs 68 hours. Presentation Skills module: Lectures 4-6 hours, small-group tutorials 3-6 hours, independent work alone and in pairs 12-19 hours of independent work.

**Target group:**

Students in the first year of their Master's programme

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Course materials will be provided in electronic form by the teachers in the two online course workspaces: *Scientific writing for biochemists* and *Scientific presentation for biochemists*.

**Assessment methods and criteria:**

Assessment is based on the learning outcomes of the course, paying attention to regular completion and quality of course tasks, with particular emphasis on the final product of each part of the course: the final presentation and the final draft of a research article.

**Grading:**

pass/fail

**Person responsible:**

Suzy McAnsh and Kari-Pekka Kallunki.

**Working life cooperation:**

-

**Other information:**

Teaching will take place at the Kontinkangas campus.

**488321S: Bioreactor technology, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ville-Hermann Sotaniemi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

488304S Bioreactor Technology 6.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

The course is held in autumn semester during period 2. It is recommended to complete the course in the 4th (1st Master's) year.

**Learning outcomes:**

After completing this course, the student will be able to verbally describe the most common equipment, materials and methods related to biotechnological processes, microbial growth and cultivation and sterilization. The student will be able to mathematically describe microbial growth and product formation, enzyme catalysis and bioreactor performance. The student will also be able to use these mathematical tools to plan and analyze bioprocesses.

**Contents:**

Biotechnological process: General process schemes, batch, fed-batch and continuous processes, biocatalysts and raw materials. Reactor design and instrumentation. Sterilization: kinetics of heat inactivation and practical implementation of sterilization methods. Mathematical description and quantification of the function of biocatalysts. Monod and Michaelis-Menten models, reaction rates and their determination. The lag phase of growth, cellular maintenance, cell death. Kinetics of product and by-product formation. Kinetics of oxygen and heat transfer. Oxygen and heat balances: significance and calculations. Mixing and power consumption. Scale-up and scale-down.

**Mode of delivery:**

Blended teaching.

**Learning activities and teaching methods:**

Lectures 40 h / exercises 4 h / homework 29 h / self-study 62 h.

**Target group:**

Master students in bioprocess engineering. Master students in process engineering, environmental engineering and biochemistry with required prerequisites.

**Prerequisites and co-requisites:**

The previous bachelor level courses in Process or Environmental Engineering (especially 488212A Fundamentals of Catalysis or 488309A Biocatalysis, 488052A Introduction to Bioproduct and Bioprocess Engineering) or respective knowledge.

**Recommended or required reading:**

Lectures: Lecture handouts; Doran, P. M. Bioprocess engineering principles. Academic Press. London, 2012. Supplementary material: Villadsen J., Nielsen J., Liden G. Bioreactor engineering principles. Springer Verlag, 2011. Shuler ML., Kargi F. Bioprocess engineering basic concepts. 2 ed. Pearson. 2002 and 2014.

**Assessment methods and criteria:**

Lectures, exercises, final exam, homework. Grade will be composed of final exam, exercises and homework.

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

DI Ville Sotaniemi

**Working life cooperation:**

No

**488305S: Advanced Course for Biotechnology, 5 op**

**Voimassaolo:** 01.08.2005 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Process and Environmental Engineering

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Johanna Panula-Perälä

**Opintokohteen kielet:** English

**Leikkaavuudet:**

480450S Bioprocesses III 5.0 op

**ECTS Credits:**

5 ECTS /135 hours of work

**Language of instruction:**

English

**Timing:**

The course is held in spring semester during period 3. It is recommended to complete the course in the 4th (1st Master's) year.

**Learning outcomes:**

After completing this course, the student will be able to describe the most important techniques - both up- and downstream - in biotechnological production of proteins.

**Contents:**

Microbial homologous and heterologous protein production. Unit operations in product recovery and purification. Biocatalyst screening and optimization. Scale-up and intensification of bioprocesses.

**Mode of delivery:**

Blended teaching.

**Learning activities and teaching methods:**

Lectures 30 h / homework 48 h / self-study 57 h.

**Target group:**

Master students in bioprocess engineering. Master students in process engineering, environmental engineering and biochemistry with required prerequisites.

**Prerequisites and co-requisites:**

Courses 488212A Fundamentals of Catalysis or 488309A Biocatalysis, 488052A Introduction to Bioproduct and Bioprocess Engineering and 488321S Bioreactor technology, or respective knowledge.

**Recommended or required reading:**

Will be announced at the lectures.

**Assessment methods and criteria:**

Lectures, exercises and report. Grade will be composed of homework exercises and reports or final examination.

**Grading:**

The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

TkT Johanna Panula-Perälä

**Working life cooperation:**

No

**744632S: Yeast genetics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744623S Yeast genetics 6.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell a basic knowledge of yeast genetics and physiology
- tell the basic principles of using the yeast model organism to address fundamental genetic and cell biological problems
- (practical course) describe variety of genetic and molecular biology techniques commonly used to manipulate baker's yeast in the pursuit of biological questions

**Contents:**

This course is an introduction to *Saccharomyces cerevisiae* as a model organism and the use of classical and molecular genetic approaches in this yeast to study basic cellular processes. We will also focus on genetic screens and selections designed to identify targets of interest. Aspects of transcriptional regulation will be discussed to provide a basic understanding for some of the screens and selections introduced. Performance in the course will be assessed by participation in the course review session at the beginning of each lecture (10% of total grade) and by a final written examination. The practical part of this is a block practical spread over two weeks (2 days – 3 days – 2 days – 3 days) running almost parallel to lecture course. It is designed to provide training in techniques and concepts commonly used in yeast genetics (streaking, spotting, mating, tetrad analysis, transformation, colony-color based assays, carbon source-dependent expression of genes, as well as generation and cloning of mutants). The course has limited enrollment for 16 people. It is also possible to only attend the lecture part of the course for 2.5 ECTS credits.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 10 days practical, final exam and oral participation in course review session

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Course review sessions, final exam, experiment reports Read more about [assessment criteria](#) at the University of Oulu webpage

**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**747694S: Final examination in protein science and biotechnology, 10 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-yr2

**Learning outcomes:**

Upon successful completion students should be able to:

- discuss the full breadth of the core topics of biochemistry, protein science and biotechnology
- Integrate material from multiple sources

**Contents:**

This examination will test the ability of students to integrate knowledge from BSc and MSc level protein science and biotechnology. The questions will require an understanding of the principles of biochemistry and protein science and will be based on subject specific material from relevant BSc and MSc level modules. The format will be an oral examination.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Student self-study

**Target group:**

M.Sc. in Protein science and biotechnology

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Oral examination

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**743666S: Introduction to immunology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Zhi Chen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740379A Introduction to immunology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc yr1-yr2 spring

**Learning outcomes:**



After the course students will be able to understand, identify, analyze and apply essential concepts of cellular and molecular components and mechanisms of immunology, and integrate their previous knowledge of molecular and cellular biology and protein chemistry with immunology and immunobiochemistry instances

**Contents:**

The course handles the basis of immunology, covering cells and mechanisms of innate and adaptive immune responses (inflammation, anti-microbial and anti-viral defenses, T-cell activation, antibody production, etc.). The course also offers insights into the physiopathology of the immune responses (chronic inflammation, allergy, autoimmune disorders, transplantation and cancer) and the clinical (immunotherapy, cytokine therapy, etc.) and industrial (monoclonal antibodies, ELISA and immunodiagnosics, etc.) applications of immunological processes.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (14 h), a written home exercise, and a final exam.

**Target group:**

Major and minor subject undergraduates

**Prerequisites and co-requisites:**

Preliminary required courses: Molekyylibiologia I, Protein chemistry I and Solun biologia, or equivalent basic molecular biology, protein chemistry and cell biology studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Home exercise, final exam

**Grading:**

1-5/fail

**Person responsible:**

Jane Chen

**Working life cooperation:**

No

**Other information:**

This module is the same as 740384A Introduction to immunology. Location of instruction: Kontinkangas campus.

**743667S: Virology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

740380A Virology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- discuss the major groups of viruses and their infection and replication mechanisms
- present and discuss characteristic features of specific viruses and their relation to pathogenesis and immunity
- describe diagnostic methods and antiviral therapy

**Contents:**

The course covers basic aspects of virology. The main emphasis will be made on viral infection, replication, transcription, proteinsynthesis, virological diagnostics, infection kinetics, defense against viruses, ways of infection, vaccination, and antiviral therapy. The course involves lectures 10h, 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures and student presentations in seminars

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

This module is the same as Virology (740385A). Location of instruction: Kontinkangas

**744625S: Scientific presentation, 1 - 2 op****Voimassaolo:** 01.03.2012 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Tuomo Glumoff**Opintokohteen kielet:** Finnish

**ECTS Credits:**

1-2 credits

**Language of instruction:**

Finnish and English

**Timing:**

M.Sc.

**Learning outcomes:**

The student makes a presentation and participates in an international scientific conference with their own presentation. The presentation may be a poster, a talk or equivalent. The student uses the skills learned in the Bachelor's thesis course or otherwise in planning and realizing the presentation. The student practices communication skills necessary for research work.

**Contents:**

Student participates in a conference and delivers a poster, a talk or equivalent. The contents of which must include student's own results, for example from the Master's Thesis work. The pro gradu supervisor or other suitable person supervises the planning and realization of the presentation.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

A poster, a talk or equivalent is delivered. The workload of the course may vary depending on the extent and the form of presentation.

**Target group:**

Major students (MSc)

**Prerequisites and co-requisites:**

No compulsory preceding courses

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Study diary, a copy of presentation or poster

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

The amount of credits is estimated based on the workload of the planning and realization of the presentation, but not the length of the meeting.

**740381A: Biochemical and biomedical innovation, 2 - 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English

**ECTS Credits:**

2-5 credits

**Language of instruction:**

English

**Timing:**

Can be taken by any BSc / MSc / PhD student

**Learning outcomes:**

The aim of the course is to get student familiar with:

- the core skill set required to recognize opportunities/needs and how to validate creative ideas
- the core skill set of searching patent databases
- the concepts of intellectual property rights (IPR)
- the concepts of how to pitch an idea

**Contents:**

This module covers basic aspects of the key skills required for successful innovation in the field of biochemistry and molecular medicine. Concepts relating to how to recognize opportunities, how to recognize what is needed in the field, creative thinking, validating ideas and how to pitch ideas are covered as well as an introduction to intellectual property rights and patent searching. In addition to workshops /seminars (19 hours) the 5 ECTS version of course requires submission of an invention disclosure/proof of concept funding or submission of an entry to the biochemistry and molecular medicine innovation award.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

19 hours of lectures/workshops

**Target group:**

Major students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

For 2 ECTS participation in at least 70% of seminars/workshops. For 5 ECTS participation in at least 70% of the seminars/workshops plus submission of an invention disclosure / proof of concept funding application to the university (PhD students) or submission of an entry to the biochemistry and molecular medicine innovation award (BSc and MSc students).

**Grading:**

Pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744631S: Dissertation, 15 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744618S    Dissertation    18.0 op

**ECTS Credits:**

15 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2

**Learning outcomes:**

Upon successful completion students are able to:

- apply information in the right context, integrate information from a wide range of sources and evaluate it critically
- communicate science in extensive written format and discuss and defend scientific arguments
- demonstrate independent work including self motivation, planning, organizational skills and time management.

**Contents:**

This module is based around the student producing an extensive, in-depth literature report in the style of a scientific review. Students are responsible for finding a suitable supervisor for their dissertation with whom they will discuss the scientific background and relevant literature. Students are strongly encouraged to meet with their supervisor weekly to discuss progress and ideas and to resolve problems. A one-page outline of the dissertation subject area, including details of the supervisor (who need not be from the University of Oulu), must be approved by the module convener before starting this module. While the dissertation subject can be closely linked with the Pro Gradu project subject, students are advised that having distinct topics for these two modules will look better on their CV.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

400 hours of student work

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written report

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

-

**300002M: Advanced Information Skills, 1 op****Voimassaolo:** 01.08.2009 -**Opiskelumuoto:** Other Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Science**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Klintrup, Outi-Mirjami**Opintokohteen kielet:** Finnish**ECTS Credits:**

1 ECTS credit / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

The course is held once in the autumn semester, during period 2 and in the spring semester, during period 4. Intended for degree students working on their diploma/master's thesis.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information for their thesis
- know how to evaluate search results and information sources
- understands the principles of scientific publishing
- can use the reference management tool.

**Contents:**

Scientific information retrieval and the search terms, the most important databases and publication channels of the discipline, tools for evaluating the quality of scientific information and RefWorks reference management tool.

**Mode of delivery:**

Blended teaching

**Learning activities and teaching methods:**

Lectures 10 h, self-study 17 h

**Target group:**

Optional

**Recommended or required reading:**Web learning material: [Subject guides](#)**Assessment methods and criteria:**

Passing the course requires participation in the lectures and successful completion of the course assignments.

**Grading:**

pass/fail

**Person responsible:**

Outi Klintrup

**080926A: Introduction to Biomedical Imaging Methods, 1 - 3 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Health Sciences**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lassi Rieppo**Opintokohteen kielet:** English

**Proficiency level:**

-

**Status:**

-

**Required proficiency level:**

-

**ECTS Credits:**

1-3 ECTS credit points / 27-81 hours of work

**Language of instruction:**

English

**Timing:**

Master studies, spring term 4th period

**Learning outcomes:**

The student understands and can describe the basic principles and main applications of imaging methods used in biomedical research.

**Contents:**

Differences between in vivo, ex vivo and in vitro imaging.

Light and electron microscopy.

Optical projection and coherence tomography.

Optical in vivo imaging.

Magnetic resonance imaging.

Fourier transform infrared imaging spectroscopy and Raman imaging spectroscopy.

Micro-computed tomography.

Basics of image analysis and interpretation

**Mode of delivery:**

Face-to-face teaching. Compulsory participation in lectures.

**Learning activities and teaching methods:**

Number of ECTS cr of the course and the methods of implementation vary. The course includes lectures 19h, demonstrations 8h and final exam 3 h. Number of hours left for independent study depends on the number of the ECTS cr the student wishes to complete and is from 8 to 51 hours.

**Target group:**

All Bachelor's, Master's and postgraduate students interested in methods of biomedical imaging.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Handouts and literature given in the lectures

**Assessment methods and criteria:**

In this field, write with which method the teacher will monitor/

Participation in the lectures and demonstrations. Exam. The course can be completed with 1, 2 or 3 ECTS cr.

1 ECTS →# compulsory participation in lectures

2 ECTS →# compulsory participation in lectures and demonstrations

3 ECTS →# compulsory participation in lectures, demonstrations and final exam

Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

The 1 and 2 ECTS cr courses utilize verbal grading "pass" or "fail". The 3 ECTS cr course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr Lassi Rieppo

**Working life cooperation:**

-

**Other information:**

-

**756627S: Plant hormones, 5 op****Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Häggman, Hely Margaretha**Opintokohteen oppimateriaali:****Taiz, Lincoln** , , 2006**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish / English.

**Timing:**

M.Sc. 1 st or 2 nd spring, (arranged if resources allow).

**Learning outcomes:**

The students will assess the plant hormone action, understand hormone interactions and the significance of the hormone balance as well as the molecular mechanisms.

**Contents:**

Plant hormones are signalling molecules with profound effects on growth and development at trace quantities. Until quite recently plant development was considered to be regulated by auxins, gibberellins, cytokinins, ethylene and abscisic acid. New analytical and molecular methods have evidenced new plant hormone receptors and signalling pathways. During the lectures the mode of action of the hormones and the latest literature is used to gain the most recent view of the topic.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

20 h and exam.

**Target group:**

Suitable for BSb and ecophysicologists.

**Prerequisites and co-requisites:**

Basics of functional plant biology lectures and exercises (752345A, 756341A).

**Recommended optional programme components:**

-

**Recommended or required reading:**

Moodle pages. Chapters concerning plant hormones from Taiz, L. et al. 2015. Plant Physiology and Development. 6 e. 761 p. Sinauer Associates, Inc. ISBN- 9781605352558 and literature given in the lectures.

The availability of the literature can be checked from [this link](#).

**Assessment methods and criteria:**

Exam.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail.



**Person responsible:**

Prof. Hely Häggman and Doc. Anna Maria Pirttilä.

**Working life cooperation:**

No.

**Other information:**

-

**040911S: Using animals in research - carrying out procedures, 3 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Laboratory Animal Centre

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Voipio Hanna-marja

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

040900S Using animals in research - carrying out procedures 2.5 op

Ei opintojaksokuvauksia.

**743662S: Extracellular matrix, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Heljasvaara, Ritva-Leena

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- Describe the structure and key components of the mammalian ECM
- Describe the main significance of the ECM for cell and tissue function
- Outline the roles of ECM in inherited connective tissue disorders and in common other diseases
- Identify connective tissue and some of its components in tissue samples using various staining protocols (laboratory work).
- Summarize background knowledge of ECM sufficiently to feel comfortable in undertaking a postgraduate research project in the ECM field

**Contents:**

Besides including basic background knowledge on the ECM, the course will highlight the ECM-related topics that are currently being investigated at the Faculty of Biochemistry and Molecular Medicine. Orientation to mouse and cell models of ECM molecules will form a crucial part in teaching. Contents of lectures in 2019: Collagens and collagen-related hereditary diseases; Proteoglycans and glycoproteins; Basement membranes; Pericellular matrix of the vasculature; Integrins and other ECM receptors; Matricellular proteins; Elastic fibres; ECM plasticity and remodeling; ECM degrading enzymes;

Stem cell microenvironments; ECM in fibrosis and cancer. The course has limited enrollment for 28 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

23 h lectures, 6 h seminars, and 36 h laboratory work. Seminars and laboratory work are compulsory

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

**Extracellular Matrix Biology** Eds. Richard O. Hynes and Kenneth M. Yamada, 2011. Cold Spring Harbor Perspectives in Biology

[http://cshperspectives.cshlp.org/site/misc/extracellular\\_matrix\\_biology.xhtml](http://cshperspectives.cshlp.org/site/misc/extracellular_matrix_biology.xhtml)

**Assessment methods and criteria:**

Continuous assessment, final exam

**Grading:**

1-5/fail

**Person responsible:**

Ritva Heljasvaara

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743663S: Developmental biology, stem cells and tissue engineering, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Aleksandra Rak-Raszewska, Vainio Seppo

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

Upon completion of the course the student have obtained an overview of how the development of tissues and organs is regulated and executed via developmental gene regulation and developmental programs behind morphogenesis. Students will become familiar with the classical and modern experimental embryological techniques during lectures and also with hands-on laboratory work.

**Contents:**

The course provides knowledge on use of various model organisms, basic information about embryology and early developmental mechanisms and signaling molecules. Introduces detailed description of

development of few organ systems and provides knowledge about classical and novel study techniques to discover new developmental ques. The course has limited enrollment for 16 students. Lecture part (2 credits) is open for all students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 h lectures and seminars, 3 assessments and 25 h laboratory work. Lectures (100% attendance), assessments and laboratory work are compulsory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, no exam

**Grading:**

1-5/fail

**Person responsible:**

Seppo Vainio and Aleksandra Rak-Raszewska

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op**

**Voimassaolo:** 01.03.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Karppinen, Peppi Leena Elina

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- Present and discuss the basic mechanisms involved in regulation of oxygen homeostasis on cellular, tissue, organ/organism level
- To integrate/adapt regulation of oxygen homeostasis under normal physiological conditions to pathological situations
- Display an understanding on how the basic biochemical knowledge translates from the bench to the bedside

- Understand the meaning of translational research

**Contents:**

General physiology of hypoxia, Hypoxia response in bacteria, Hypoxia response in yeast, Hypoxia-inducible factors (HIFs), Regulation of HIFs on the transcriptional, translational and post-translational level, Conditions related to hypoxia response (erythropoiesis and iron regulation, angiogenesis and metabolism), Experimental models to study hypoxia, HIFs and HIF prolyl 4-hydroxylases as drug targets. Lecture topics may vary.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 22 h seminars (obligatory) and 4 h round table discussions (obligatory).

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles.

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Peppi Karppinen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743665S: Molecular, cell biological and genetic aspects of diseases, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Valerio Izzi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

740396A	Molecular, cell biological and genetic aspects of diseases	5.0 op
743659S	Biochemistry of cell organelles	3.0 op
743604S	Biochemistry of inherited diseases	3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- based on biogenesis, structure and function of the key cell organelles discuss their role in pathology and describe organelle-specific disease mechanisms
- describe typical inherited diseases in terms of their occurrence, biochemistry behind their origin, and their analysis and treatment possibilities
- present and defend a scientific presentation on a theme related to inherited diseases.

**Contents:**

The course provides knowledge on structure and function of mitochondria, peroxisomes, endoplasmic reticulum (ER) and the Golgi apparatus, and diseases - also inherited ones - concerned with these cell organelles; as well as gene defects, their inheritance, detection and correction with gene therapy. The course involves student presentations of latest findings on inherited diseases as pair work.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

34 h lectures and seminars including student presentation and student opponents. Seminars are obligatory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

B.Sc. in biochemistry or biology or otherwise adequate knowledge on basic biochemistry and cellular and molecular biology.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles. Recommended accompanying texts: Thompson & Thompson, Genetics in Medicine; Strachan, T., Read, A.P.: Human Molecular Genetics, Bios. Scientific Publishers Limited; Aula et al., Perinnöllisyyslääketiede

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas

**740079Y: Activities in University and Student Organizations, 1 - 10 op**

**Voimassaolo:** 01.01.2017 -

**Opiskelumoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish, English

**ECTS Credits:**

1-10 ECTS

**Language of instruction:**

Finnish/English

**Timing:**

During academic studies

**Learning outcomes:**

Upon completion of the course, the student will be able to

- apply the skills needed in academic positions of trust (interaction skills, meeting techniques, working in a group, cooperation skills, leadership skills)
- evaluate critically the issues to be decided, take a stand on them and justify his or her viewpoint
- attend to the functions related to his or her position of trust in a responsible manner

**Contents:**

The course can include functions in a number of positions of trust as follows:

- Student Union Board, 1 year, 4-5 credits
- Student Union representatives, 2 years, 2 credits
- University Board of Directors, 1 year, 2 credits
- University Collegium, 2 years, 2 credits
- Education Council, 1 year, 2 credits
- Faculty Board, 2 years, 2 credits
- Board of a subject organization or a student guild, 1 year, 1-3 credits
- National student organization such as SYL, 1 year, 1-5 credits
- Other important functions in the field of education policy and/or development of teaching, such as Education Committee or section of the Student Union, 1-3 credits

The number of credits to be awarded to the student is determined by the Dean of Education based on available documentation following the principles mentioned above.

**Mode of delivery:**

Independent work

**Learning activities and teaching methods:**

Independent report

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The student shall write a learning diary of the position(s) of trust that she or he has been managing, discussing the following issues:

1. Which organization has the student been working in, how long and how actively has s/he been taking part in its activities?
2. What does the student think s/he has learnt from the position of trust? (With special consideration of these working life skills: communication skills, social skills, technical skills, international competence, commercial and financial competence, development of self-knowledge)
3. How can the student make use of his or her experience in the future?
4. In the student's mind, how should the preparation of matters be developed?

The learning diary and proof of having been in charge of a position of trust are returned to the Chief Academic Officer of the Faculty who will determine the number of credits to be awarded. The length of the learning diary is 2 – 5 pages (font 11, line spacing 1).

**Grading:**

Pass/fail

**Person responsible:**

Dean of Education Tuomo Glumoff

**Working life cooperation:**

Active participation in student organizations and in University decision making develops generic working skills.

**Other information:**

The maximum number of credits for the activities mentioned above is 10 credits in one to two parts. The credits can be included in general studies

**743668S: Tumor cell biology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

743657S Tumor cell biology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- name, list and discuss the major aspects including formation of a tumor cell
- present, describe and discuss characteristic aspects of oncogenes and tumor suppressor genes
- use methods to study, examine and to analyse tumor genesis and tumor progression

**Contents:**

The course covers basic aspects of the main pathways inducing formation of a tumor. The main emphasis will be made on modes of carcinogenesis, tumor metabolism, the formation of oncogenes, the action of tumor suppressor genes and the induction of tumors by viruses.

The course covers also aspects of tumor diagnostics and therapy. The course involves lectures 20h with included 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures and student presentations upon request in seminars

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744637S: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Caglar Elbuken

**Opintokohteen kielet:** English

**ECTS Credits:**

5 ECTS

**Language of instruction:**

English

**Timing:**

Autumn

**Learning outcomes:**

The students are expected to learn the fundamentals of micro/nanofluidics and be able to apply those concepts to several applications. Another major goal of the course is to give the students enough tools so that they can follow the state-of-the-art developments in the field from the leading journals such as RSC Lab on a Chip, Wiley Small, ACS Analytical Chemistry. The students are also very briefly exposed to the recently growing field of nanofluidics through comparisons between micro and nano-scale physics. The students will be introduced with the biosensors and their operating principles.

**Contents:**

The goal of this course to cover the fundamentals and the latest developments in the field of micro/nanofluidics and their application areas in sensing and diagnostics. The first half of the course (modules 1-6 below) is intended to cover the fundamental fluidic concepts. The second half of the course (modules 7-12) covers the application areas of microfluidic and LOC systems, such as biosensors and point-of-care diagnostic devices. Finally, the trending topics in the field are covered.

For students interested in a hands-on experience, an extended module with multiple laboratory sessions is available (option-2). The lecture is a pre-requisite to take the laboratory practice session.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures + online exercises

**Target group:**

BSc and MSc level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-



**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

In-class quizzes, homework, term project, final exam

**Grading:**

1-5/fail

**Person responsible:**

Caglar Elbuken

**Working life cooperation:**

-

**Other information:**

Location of instruction: Kontinkangas campus

**ay724102P: Management and Organizations (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724102P Management and Organizations 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

Upon completion of the course, the student will be able to distinguish the concepts related to organization, organizing as well as managerial and entrepreneurial work. This understanding helps the student's ability to identify organizational processes in everyday work-life interventions and to list the possible change factors within a chosen organization. The student is also able to identify different kinds of organizations and can define the different principles of management styles. The student is able to understand various ongoing functions within organizations and their requirements for the organizations' management. The student understands the role of organizational development and learns to register the most essential challenges of management in the current organizations.

**Contents:**

The course covers the topics and questions of organizations and management, human organizing and processes as well as change management. The premises of the course are the traditional management schools of thought (scientific management, human relations school of thought, Hawthorne-studies, etc.) that the course goes through thoroughly. The course builds the newest questions of organizational theoretical approaches (change, processuality, etc.) on this understanding. In the course the students are introduced with the development of organizations and management, by presenting different organization types and management styles as well as the ways how those issues affect organization functioning.

**Mode of delivery:**

lectures, visiting lecturers, case-practices and group works.

**Learning activities and teaching methods:**

lectures (36 hours, including case-practices and group work of 9 hours), reading the course material (45 hours), preparation for the exam (52 hours).

**Recommended or required reading:**

Gareth Morgan (1997 tai uudempi). [Images of organization](#). London: Sage Publications.  
 Hannele Seeck (2012 tai uudempi). [Johtamisopit Suomessa](#). Helsinki: Gaudeamus.  
 Luentomateriaali.

**Assessment methods and criteria:**

Written exam of lectures and literature.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724105P: Management Accounting (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724105P Management Accounting 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After passing the course, the student knows the basic cost concepts and the elements of cost accounting systems. Students are also able to apply the basic cost information in the company's decision making and explain which costs should be included in these calculations under different circumstances.

**Contents:**

Theoretical framework for understanding cost accounting, cost concepts, cost recording, different product costing methods, cost-volume-profit analysis, using cost accounting information in decision making.

**Learning activities and teaching methods:**

20 h lectures, 16 h exercises and independent reading of study materials (97 hours).

**Target group:**

Major students in economics and business administration

**Recommended or required reading:**

[Drury, C.: Management and cost accounting, 7th or 8th ed. Cengage Learning EMEA. Chapters 1-11 \(8th ed.\);](#)

Supplementary material: [Järvenpää, M.- Lämsiluoto, A - Partanen, V. – Pellinen, J.: Talousohjaus ja kustannuslaskenta, WSOYpro, chapters 1-8.](#)

**Assessment methods and criteria:**

Lectures and literature examination.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Working life cooperation:**

Understanding of management accounting systems is typically an important part of work for graduates in economics and business administration and an essential part of occupations like management accountant or controller.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppsy.fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724108P: Financial Markets (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724108P Financial Markets 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4

**Learning outcomes:**

The course is an introduction to the role and functions of financial markets and institutions. Upon successful completion of the course, the student will be able to describe the basic structure and operational principles of financial markets and to identify different types of financial instruments and their characteristics.

**Contents:**

1) the role of financial markets and institutions in the economy, 2) main types of financial assets, their properties, and basics of pricing, 3) stock markets, bond markets, markets for bank obligations, treasury securities markets, derivative markets, mutual funds, private equity

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (26 h), visiting lectures (10 h), self-study (94 h), exam (3h)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

[Pilbeam: Finance & Financial Markets \(3<sup>rd</sup> edition\), Palgrave Macmillan](#)

Other material announced during the lectures

**Assessment methods and criteria:**

Examination, lecture diaries

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Prof. Juha-Pekka Kallunki

**Working life cooperation:**

General knowledge of the functions of financial markets and the various market participants

**Other information:**

The number of students is limited.

**ay724110P: Introductory Economics (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724110P Introductory Economics 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

Period A. It is recommended that students complete the course during the first autumn semester.

**Learning outcomes:**

After completing the course students (i) understand the basic concepts of economics and the rudiments of economic theory, (ii) can explain the determination of resource allocation and prices in a market economy, (iii) know how the aggregate economy operates in the short and long run, and (iv) how economic policy affects the Finnish economy and also the European economy.

**Contents:**

The course introduces students to the tools and ideas economics uses to describe and explain economic phenomena. The topics include:

- the long-term development of the Finnish and World economy
- basic ideas and principles of economics
- opportunity cost and comparative advantage
- market equilibrium: demand and supply
- how well does market economy work?
- firms and competition in market economy
- aggregate economic activity and its measurement
- business cycles
- monetary and fiscal policy
- economic growth

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

36 lectures including problem sets. Students are expected to do the problem sets on their own and familiarize themselves with the required and recommended materials (93 h). Mid-term exams (2) or Final exam (3 h).

**Target group:**

Sivuaineopiskelijat ja avoimen yliopiston opiskelijat

**Recommended or required reading:**

Material posted at the webpage.

Textbook: [Acemoglu, D., Laibson D. and List, J.A., Economics, 2015](#)

and extra readings: [Timothy Taylor, The Instant Economist. Everything You Need to Know About How the Economy Works. 2012. A Plume Book \(Penguin\), New York NY.](#)

Robert P. Murphy, Lessons for the Young Economist. Ludvig von Mises Institute 2010; [http://mises.org/books/lessons\\_for\\_the\\_young\\_economist\\_murphy.pdf](http://mises.org/books/lessons_for_the_young_economist_murphy.pdf)

**Assessment methods and criteria:**

Final Exam.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Marko Korhonen

**Working life cooperation:**

Students learn relevant and useful facts about the operation of the markets, and the aggregate economy to an extent that they can reasonably utilize those facts and knowledge in the decision making of the business they are working at.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724111P Finnish Economy and Economic Policy 5.0 op

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After the course the student is capable of outlining the economic history of Finland, to describe the position of Finland in the global economy and to evaluate the challenges of the Finnish economy now and the future. In addition, the student can describe the main features of the different areas in the Finnish economy.

**Contents:**

The course provides an overview of the Finnish economy and economic history, its current state and future development. The course deals with the activities of the Finnish economy and development, such as globalization, regional economy and general economic policy.

Lectures will include the following themes

1. The Finnish economy from the late 1800s to the early 2000s
2. Productivity and economic growth
3. Globalisation and Finland
4. Regional development and regional policy in Finland
5. Fiscal policy
6. Public economics and challenges of welfare state
7. Finance and economic development in communes
8. Innovations and innovation policy

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures, reading the course literature (93 h) and exam (4 h).

**Recommended or required reading:**

Announced by the lecturer.

**Assessment methods and criteria:**

Lecture- and literature examination and course assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkkyo.fi/fi/kauppatieteiden-sivuaeineopinnot-perusopinnot-25-op-oy-aya633707/>

**555225P: Basics of industrial engineering and management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Elina Jääskä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555225P	Basics of industrial engineering and management (OPEN UNI)	5.0 op
555221P	Introduction to Production	2.0 op
555220P	Basic Course in Industrial Engineering and Management	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Period 1.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe what industrial engineering and management (or operations management) means
- explain the core concepts of business operations and utilise these concepts in describing and analysing operations of an organisation
- explain in general terms the factors that affect economic performance of organisations
- utilise the terminology used in industrial engineering and management (operations management), describe the financial processes of companies and based on this describe the use of cost accounting in organisational decision-making
- calculate unit costs in various simplified settings, calculate various alternatives, as well as perform planning and goal oriented calculations based on given data, and draw conclusions based on the calculation results

**Contents:**

Operations and productivity, operations strategy, forecasting, accounting and cost accounting, investments and financial planning, sustainability, capacity management, location decisions, layout strategies, human resources management, supply chain management, subcontracting, inventory management, production planning, MRP & ERP, production scheduling, Just-in-Time & Lean operations, maintenance.

**Mode of delivery:**

Web-based teaching 20 hours / practices 14 hours / Independent studying 100 hours.

**Learning activities and teaching methods:**

Web-based lectures 20 h / exercises 14 h / self-study 100 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555285A Project management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture and exercise materials. Heizer, J. & Render, B. (2014) Operations management: sustainability and supply chain management, 11th ed. Pearson. In addition, recommended materials include Martinsuo, M. et al. (2016) Teollisuustalous kehittyvässä liiketoiminnassa chapters 7-9, 16 and 26.

**Assessment methods and criteria:**

This course utilises continuous assessment. During the course, there are seven mandatory weekly assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

MSc (Tech.) Elina Jääskä

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555220P Basic Course in Industrial Engineering and Management 3 ECTS cr and 555221P Introduction to Production 2 ECTS cr.

**555285A: Project management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555288A Project Management 5.0 op

ay555285A Project management (OPEN UNI) 5.0 op

555282A Project Management 4.0 op

555280P Basic Course of Project Management 2.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. Check the course in English 555288A Project Management.

**Timing:**

Period 2.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe explain the essential concepts and methods related to project management
- apply project management methods to create a schedule for a project and calculate critical path
- understand essential concepts related to project cost management and able to apply earned value method and three point estimate to manage project costs
- recognises the essential tasks of project risk management

**Contents:**

Defining project management, project goals and objectives, project phases and project life-cycle management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management, project stakeholder management, project communications management, the role of project manager, new modes of project delivery

**Mode of delivery:**

The tuition will be implemented as web-based teaching.

**Learning activities and teaching methods:**

Web-based lectures 16h, self-study 118h

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture material, exercise book, Arto, Martinsuo & Kujala 2006. Projekttiliiketoiminta. WSOY

**Assessment methods and criteria:**

Weekly assignments and final online exam

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Assistant professor Kirsi Aaltonen

**Working life cooperation:**

Videos from the industry's projects

**Other information:**

Substitutes courses 555280P Basic Course of Project Management + 555282A Project Management.

**555242A: Product development, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies



**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Haapasalo, Harri Jouni Olavi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay555242A Product development (OPEN UNI) 5.0 op

555240A Basic Course in Product Development 3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

English.

**Timing:**

Periods 1-2.

**Learning outcomes:**

This course introduces product development and innovations management in a company environment. The course provides fundamental understanding over tools and frameworks that can be used for analysing and managing products, innovations, and technology development. The aim is to create a connection between product development and other company functions. Upon completion of the course, the student will be able to

- explain the role of product development as a company function
- understand the difference between innovation activities and systematic product development, and knows the difference between different phases of product development process and its activities
- transform customer needs into requirements for product development process and finally into product features
- define the meaning of other company functions to product development activities

**Contents:**

Meaning of products for the operations of an industrial enterprise, product development paradigm and defining relevant concepts, realising product development methodologically (U&E model, Cooper's stage-gate model, QFD), managing innovations, and product development success factors.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching.

**Learning activities and teaching methods:**

Lectures 20 h / exercises 6 h / group work and self-study 108 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

555226A Operations and supply chain management (Operations and production)

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Handouts, course work, and a collection of articles. Ulrich, K. & Eppinger, S. (2008) Product Design and Development. McGraw-Hill. 358 p.

**Assessment methods and criteria:**

Exam and group work.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Professor Harri Haapasalo.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555240A Basic Course in Product Development.

**555264P: Managing well-being and quality of working life, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Arto Reiman

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555264P	Managing well-being and quality of working life (OPEN UNI)	5.0 op
555261A	Basic Course in Occupational Psychology	3.0 op
555262A	Usability and Safety in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Periods 3-4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- set targets and choose appropriate methods of developing well-being at work both at personal and organizational levels
- develop well-being at work in the contexts of labor legislation, good practices, productivity, occupational safety expertise, management and human resources
- know the key sources of information, typical goal-setting and management practices and the methods for assessing the performance at individual and organizational levels
- assess the economic impacts of well-being at work, especially in cases of work ability, occupational health, job satisfaction, occupational safety, productivity and the overall quality of working life
- know essential national and international regulation and strategic goal setting practices, good practices of the case companies, current trends, and methods in research.

**Contents:**

The course gives the student a vision of building sustainable, productive and satisfactory career. The contents cover the whole area of basic quality issues of working life analysing them in the following framework "Well-being at work means safe, healthy, and productive work in a well-led organisation by competent workers and work communities who see their job as meaningful and rewarding, and see work as a factor that supports their life management".

**Mode of delivery:**

The tuition will be implemented as blended teaching (web-based teaching and face-to-face teaching).

**Learning activities and teaching methods:**

Lectures 10 h / self-study 70 h / group work & exercises 42 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial Engineering and Management that also includes 555225P Basics of industrial engineering and management, 555285P Project Management, 555242A Product development, and 555286A Process and quality management.

**Recommended or required reading:**

Applicable parts of Arnold, J. et al. (2010), Work Psychology; Understanding Human Behaviour in the Workplace. 5th Edition. Financial Times/Prentice Hall and Aura, O. & Ahonen, G. Strate-gisen hyvinvoinnin johtaminen, Alma Talent. Other literature will be informed during the course.

**Assessment methods and criteria:**

This course utilises continuous assessment including exercises during the lectures (weight 20 %), group work (weight 40 %) and examination (weight 40 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr. Arto Reiman

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555261A Basic Course in Occupational Psychology + 555262A Usability and Safety in Product Development.

**724811P: Entrepreneuring for Sustainability, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 2

**Learning outcomes:**

After the course the students should:

Understand the roles of entrepreneurship in creating socially responsible change in society, know how to map and analyze alternative sustainable entrepreneurial business ideas based on individual strengths, values and the UN SDGs, know creative problem solving assessment methods, know how to communicate about entrepreneurial ideas.

**Contents:**

Course description

The course outlines interdisciplinary skills and knowledge that foster the creation of a sustainable entrepreneurial mindset. These skills include problem solving, creativity, networking, communications, risk-taking and adaptability. Entrepreneurship is approached through its different forms and roles in various contexts of society, ecosystems, and businesses. The focus is on entrepreneurial mindsets, responsible

business and what entrepreneurship requires from individuals and teams, especially from the “me/us as entrepreneur” standpoint. During the course students familiarize themselves with the role of business and entrepreneurship in building sustainable societies. In addition, students have the opportunity to present their sustainable business ideas to responsible business experts.

**Course objectives**

Students develop skills for creative problem solving; students understand that entrepreneurial behavior can take place within many contexts (new ventures, associations, government agencies, and existing businesses); students identify their alternative roles, opportunities, and viewpoints regarding entrepreneurial choices they can make; students strengthen their skills of responsible business and are able to assess choices for business as promotor of social change based on the UN Sustainable Development Goals; students are able to define and assess alternative contexts for entrepreneurial action and to create and assess alternative business scenarios for their future; students are able to recognize and analyze business opportunities and social/customer problems and challenges; students are able to create and evaluate alternative solutions to the identified opportunities, problems, and challenges of responsible business; students are able to communicate effectively about their entrepreneurial ideas.

**Mode of delivery:**

Lectures, workshops and online learning

**Learning activities and teaching methods:**

Learning takes place mostly in groups by means of intensive lectures and workshops, visitor presentations and discussions, both in class and via online learning platform. The course includes 36 contact hours. Reading the course literature (20 h), Groupwork (80 h) and learning diary report (35 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Further details will be provided by the responsible persons in the first session.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Anne Keränen and Jan Hermes

**Working life cooperation:**

The course incorporates real life case examples and meetings with sustainable entrepreneurship practitioners and experts. Students learn interdisciplinary skills that can be applied in real working life.

**Other information:**

The number of students is limited.

**555286A: Process and quality management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Osmo Kauppila

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555286A	Process and quality management (OPEN UNI)	5.0 op
555281A	Basic Course of Quality Management	5.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish.

**Timing:**

Period 4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- explain the role of process and quality management in a business organisation
- develop business processes based on the principles of quality management and appropriate tool

**Contents:**

Foundations of total quality management, planning of quality, performance measurement, process management, people management in relation to quality management, implantation of total quality management.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching (integrated classroom lectures and exercises).

**Learning activities and teaching methods:**

20 h lectures, 114 h independent study

**Target group:**

Industrial Engineering and Management students and other students studying Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555242A Product development, and 555264P Managing well-being and quality of working life.

**Recommended or required reading:**

Oakland, J.S. (2014) Total quality management and operational excellence (4th ed.). Routledge, 529 pp. and material handed out during the course.

**Assessment methods and criteria:**

To pass the course, the student must pass the weekly course exercises (50 % of the course grade) and an exam (50 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Osmo Kauppila.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555281A Basic Course of Quality Management.

**724812P: Building Change Through Entrepreneurship, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ahmad Arslan

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay724812P Building Change Through Entrepreneurship (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 3

**Learning outcomes:**

After the course completion, the students should:

1. Have the basic knowledge about start-ups and new business creation
2. Have the ability to find and utilize information for new business creation
3. Have the knowledge how to analyze own business-case
4. Have the knowledge how the to plan a new start-up
5. Have the ability to present own business-case

**Contents:**

Lectures will focus on the following themes:

Introduction to Entrepreneurship  
 Recognizing Opportunities and Generating Ideas  
 Feasibility Analysis  
 Industry and Competitor Analysis  
 Developing an Effective Business Model  
 Building a New Venture Team  
 Assessing New Venture's Financial Strength and Viability  
 Writing a Business Plan  
 Getting Finance or Funding  
 Preparing for and Evaluating Challenges of Growth

**Mode of delivery:**

Face-to-face teaching complemented with online resources

**Learning activities and teaching methods:**

The course consists of lectures and workshops (32 h), preparation for lectures and workshops (18 h), and, reading the literature and preparation for assignments (50 h), and writing the assignments (40 h).

**Target group:**

B.Sc. and M.Sc. students from different faculties in the university as well as exchange students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

None

**Recommended or required reading:**

- Bruce R. Barringer and R. Duane Ireland (2006). Entrepreneurship: Successfully Launching New Ventures. Pearson Education.
- Slides and relevant online resources

**Assessment methods and criteria:**

Individually written assignments. Completion of 10 assignments correspond to revving grade 5, while minimum two are needed to get 1 in order to pass the course

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Ahmad Arslan and Anne Keränen

**Working life cooperation:**

Practical insights to new business creation tested through several assignments addressing different aspects associated with it.

**Other information:**

The student number is limited to 50.

**724813P: Entrepreneurship in Action, 5 op**

**Voimassaolo:** 01.08.2017 - 31.12.2020

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Niina Karvinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Periods 1-4

**Learning outcomes:**

Upon completion of the course, the students can apply the core competencies of his/her studies in a real-life entrepreneurship context. Students can realize and start working with a business opportunity or social problem in practice to find a solution. The student will improve his/her entrepreneurial skills; multicultural group working, problem solving, communicating and presenting.

**Contents:**

In these studies students generally co-operate in workshops where they learn practical methods of entrepreneurship like business model creation and validation processes, lean methodology, marketing, branding, basic financial management and presenting ideas e.g. pitching.

**Mode of delivery:**

Face-to-face teaching and coaching.

**Learning activities and teaching methods:**

Bootcamps, workshops, group work, individual guidance. Most of the exercises are completed as group work (132 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Programme specific assessment that may include both group and individual assessment methods.

**Grading:**

The course utilizes grading scale "pass/fail"

**Person responsible:**

Niina Karvinen ja Anne Keränen

**Working life cooperation:**

The programs of this course are run in close co-operation with relevant business partners or applied to practice. Students also learn practical entrepreneurship skills.

**Other information:**

The number of students is limited

**724814P: Introduction to Business Development, 5 op**

**Voimassaolo:** 01.08.2017 - 31.07.2021

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Antti Muhos

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 1

**Learning outcomes:**

Students are familiar with basic business concepts and theories in SME context. On successful completion of the course, students understand the business development process from opportunity recognition to a launch and development of a sustainable business. The students are able to identify basic business processes in practice.

**Contents:**

The course focuses on the basic concepts of SME business management and development including opportunity recognition, experimentation and testing of a new business idea, strategy, business model development and business planning, financing and planning and management of growth and change.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Face-to-face teaching including lectures, guest lectures, company visit/s and variable action-based learning methods (36h). Individual assignment (20h) and reading of course materials (76 h).

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Selected readings from e.g.: Spinelli & Adams. 2012, 2016. New Venture Creation: Entrepreneurship for the 21st Century. McGraw-Hill, New York. Allen, K. 2012. New venture creation. South-Western. Moreover, additional materials are provided during the course.

**Assessment methods and criteria:**

Learning diary, group assignment/s

**Grading:**



The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Matti Muhos

**Working life cooperation:**

This course is designed as an integral part of entrepreneurship studies. This course will include real life case studies of established and emerging businesses by company visits.

**Other information:**

The number of students is limited

**724815P: Entrepreneurial Assignment, 5 op**

**Voimassaolo:** 01.06.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Sari Perätalo

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

The schedule for the course is dependent on the entrepreneurial event or training in which student takes part in.

**Learning outcomes:**

Upon completion of the course the students are familiarized with entrepreneurial activity in society and possess skills that help to solve entrepreneurial problems and make change. Students will have an insight into the diversity of entrepreneurship and gain understanding of the specific aspects of entrepreneurship.

**Contents:**

Studies are tailored upon acceptance by the course instructor. The course consists of two parts: practice, and theory. Students compile the course through participating in different entrepreneurship supporting activities. The students can for example participate in Tellus boot camps, events or volunteering program. In addition, students can include activities organized by other stakeholders (e.g. faculties, public organizations or third sector organizations). In addition, the students reflect their learning in a report.

**Mode of delivery:**

Face-to-face teaching including entrepreneurial project, event, workshop, etc. Individual written assignment and reading the agreed materials.

**Learning activities and teaching methods:**

Individual and group work (132h). Teaching methods vary depending on the entrepreneurial project, event, workshop, etc. a student has participated in.

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course.

**Assessment methods and criteria:**

Assessment is based on an individual report that a student is expected to deliver after participating in an entrepreneurship-related event, workshop, project, etc.

**Grading:**

The course utilizes verbal grading scale "pass/fail".

**Person responsible:**

Sari Perätalo

**Working life cooperation:**

The course allows the students to gain first-hand entrepreneurial experience in various forms.

**Other information:**

Contact the responsible teacher to enroll in the course.

**724816P: Building Business Through Creativity and Collaboration, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 4

**Learning outcomes:**

During the course the student will explore entrepreneurship from the perspective of an artistic process and learn the process of designing improbable solutions. The students are challenged to question mainstream values, assumptions taken for granted, and ways of doing things. The course gives the student tools that are needed in developing improbable business models and solutions that can shift paradigms.

During the intensive workshops of the course, the student will work in teams and learn to regulate emotions, such as uncertainty, frustration, enthusiasm, and joy.

Upon completion of the course, the student will:

- develop entrepreneurial leadership
- increase abilities to build new inspiring visions
- master agile methods of creation to deal with uncertainty and risks
- learn how to use diversity and improbable encounters to develop business
- connect passion and convictions with a project which creates value
- leverage failure to increase creativity and resilience

**Contents:**

Entrepreneurs develop activities that aim to challenge the status quo, break rules and subvert systems. Furthermore conflicts, emotional strains and uncertainties are often part of entrepreneurship. But how can such things be taught/learned?

The course introduces Art Thinking, an agile method to create improbable outcomes with certainty. The method enables out-of-the-box thinking and creative productions where encounters of all sorts are key resources. Instead of writing business plans, the participants create during the Improbable workshops artistic prototypes and organize an art exhibition.

During the Improbable workshops students will be taught the Art-Thinking Method which involves 6 main activities. The students will:

- (1) engage in gift-giving practices which foster new and unusual partnerships (Donate);
- (2) "steal" from others to create unique propositions (Deviation);
- (3) follow a journey without a clear goal but which will eventually make a lot of sense (Drift);
- (4) challenge existing rules and values as well as their taken-for-granted assumptions (Destruction);
- (5) accept criticism to learn from others (Dialogue), and
- (6) exhibit their work to get feedback and find new partners (Display).

**Mode of delivery:**

Face-to-face sessions and workshops

**Learning activities and teaching methods:**

Participation in the workshops. Producing a piece of art and presenting it at an art exhibition together with others. Completion of the group work and individuals tasks, such as reading course materials and reflecting the learning experiences.

**Target group:**

Open to all University Sstudents

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course

**Assessment methods and criteria:**

Compulsory participation and commitment to the teamwork. Assessment of the course tasks.

**Grading:**

The course utilizes verbal grading scale "pass/fail"

**Person responsible:**

Mia Kemppaala, Anne Keränen

**Working life cooperation:**

Students learn practical entrepreneurial skills through artistic process.

**Other information:**

The number of students is limited

**H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

**746601S: Advanced studies in biochemistry in other universities, 0 - 75 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock  
**Opintokohteen kielet:** Finnish  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Advanced Studies  
**Laji:** Course  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Lloyd Ruddock  
**Opintokohteen kielet:** English  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **746609M: Studies in other universities/institutes, 0 - 50 op**

**Voimassaolo:** 01.08.2014 -  
**Opiskelumuoto:** Other Studies  
**Laji:** Course  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Renata Prunskaitė-Hyyryläinen  
**Opintokohteen kielet:** Finnish  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **902100Y: English for Biochemists 1, 3 op**

**Voimassaolo:** 01.08.2005 -  
**Opiskelumuoto:** Language and Communication Studies  
**Laji:** Course  
**Vastuuyksikkö:** Languages and Communication  
**Arvostelu:** 1 - 5, pass, fail  
**Opintokohteen kielet:** English  
**Leikkaavuudet:**  
 ay902100Y English for Biochemists 1 (OPEN UNI) 3.0 op

##### **Proficiency level:**

CEFR B2 - C1 for Reading, Speaking and Listening

##### **Status:**

Compulsory for all 1st year biochemistry students unless you have received the grade "L" or "E" in the Finnish matriculation exam, in which case you can be exempted from some part of the course. More information on attendance requirements will be provided in the first lesson.

##### **Required proficiency level:**

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise.

##### **ECTS Credits:**

The student workload is 80 hrs work/ 3 ECTS credits.

##### **Language of instruction:**

English

##### **Timing:**

The first part of English for Biochemists 1 (EfB 1a): 1st year autumn (periods 1 and 2); and the second part of English for Biochemists 1 (EfB 1b): spring term (period 3)

**Learning outcomes:**

By the end of the course students will have demonstrated an ability to:

- communicate effectively and precisely about professional matters,
- take effective notes from textbooks and lectures and summarise field-related texts,
- present field-related subjects and use appropriate field-related vocabulary,
- defend a position in a debate.

**Contents:**

The aim of this course is to develop reading and listening comprehension skills and oral/aural fluency of participants, and their familiarity with discipline-specific vocabulary. Core skills practiced on this course are the following:

**EfB 1a:** reading in order to understand biochemistry texts, textbooks and research articles; applying different reading strategies to extract global or detailed information according to the reading purpose; understanding word formation in order to expand vocabulary, both general scientific and field-specific; understanding basic grammatical structures of scientific English as well as text structure and cohesion markers for improved comprehension.

**EfB 1b:** practicing oral/aural skills relevant to studying at university level, taking part in the scientific community using professional vocabulary and demonstrating field-related knowledge (discussions, debating, etc.)

**Mode of delivery:**

Contact teaching, small-group tutorials and online self-study elements

**Learning activities and teaching methods:**

EfB 1a: contact teaching 20 hours and independent work 32 hours; EfB 1b: contact teaching for whole class 6-8 hours, small group tutorials 2x1 hour (minimum) and independent work 18 hours.

**Target group:**

1st year Biochemistry students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

Part of the course is integrated with the [740143P Biomolecules for Biochemists](#) course.

**Recommended or required reading:**

Course materials will be provided by the teacher in electronic form.

**Assessment methods and criteria:**

The course utilises continuous assessment that is based on the learning outcomes of the course. In addition, full and active participation in all course activities is required, students must pass the end-of-term test, and defend their position effectively in the debate in the *Biomolecules for Biochemists* course.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Pass/fail

**Person responsible:**

Kari-Pekka Kallunki

**Working life cooperation:**

-

**Other information:**

Exemption from part of the course **is given to students** with a matriculation exam grade *laudatur* or *eximia cum laude approbatur* and those who have graduated from an IB-programme. However, **attendance is compulsory for ALL students at the first lesson**, where more information will be provided to those who are due exemption.

## 740076Y: Orientation, 2 op

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jari Heikkinen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

2 credits

**Language of instruction:**

Finnish

**Timing:**

BSc yr1 autumn-yr1 spring

**Learning outcomes:**

Upon completion of the course the students should be able to:

- go in Linnanmaa and Kontinkangas campus and find various supporting services
- use university terminology
- plan his studies and create a personal study plan (PSP) according to BSc degree structure
- use Weboodi to support his studies
- describe research work done in the faculty and biochemist's work

**Contents:**

Course familiarizes students with university studies and environment and illustrate goals and content of biochemistry degree programme. Under the guidance of faculty personel (Chaperones) students see the spectrum of scientific research done in the Faculty and biochemists doing a research work. In a seminar "biochemist in working life" biochemists graduated from the Faculty give a talk on their experiences in working life.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

10-15 h group work (small group tutoring), 16 h presentation of research work done in the Faculty, 2 h seminar

**Target group:**

yr1 BSc students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Active attendance

**Grading:**

Pass/fail

**Person responsible:**

Jari Heikkinen and small group tutors and chaperones

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa and Kontinkangas

## **901051Y: Second Official Language (Swedish), Oral Skills, 2 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course

**Vastuuyksikkö:** Languages and Communication

**Opintokohteen kielet:** Swedish

**Proficiency level:**

This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginners' courses in Swedish at the university.

## **901050Y: Second Official Language (Swedish), Written Skills, 1 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course

**Vastuuyksikkö:** Languages and Communication

**Opintokohteen kielet:** Swedish

**Proficiency level:**

This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginners' courses in Swedish at the university.

## 740144P: Biochemical Methodologies I, 8 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kaija Autio

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay740153P	Basic biochemistry 2: Methods (OPEN UNI)	2.0 op
740151P	Biochemical methodologies I	10.0 op
740117P	Basic methods in biochemistry	4.0 op
740136P	Laboratory course in basic methods of biochemistry	3.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

8 credits

**Language of instruction:**

Finnish

**Timing:**

autumn (lectures), spring (laboratory practicals)

**Learning outcomes:**

Upon successful completion students are able to:

- use basic methods used in biochemical research laboratory
- Use laboratory equipment and work safely
- Prepare solutions used in the lab
- document experiments in the laboratory

**Contents:**

This module covers the basic methodologies used in practical biochemistry. The following topics will be addressed: safety in the laboratory, qualitative and quantitative observations, the calculations of concentrations and dilution factors (includes a workshop), pipette cleaning and calibration, identification and quantification of biological molecules, principals and practice of the use of centrifuges, spectrophotometry, SDS-PAGE, agarose gel electrophoresis, thin-layer and paper chromatography, basics of protein purification, extraction of chromosomal DNA from bacteria, mini-prep extraction of plasmid DNA, extraction of RNA from mammalian tissue, sterile technique, basic microbial growth, dialysis, filtration and pH measurement.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

18 h le, 2h exercises, 120 h lab. Laboratory work is compulsory. It is possible to complete lecture part only (3.5 ECTS).

**Target group:**

Biology BSC-BS

**Prerequisites and co-requisites:**

Biomolecules, Biomolecules for Biochemists tai Biomolecules for Bioscientists

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended reading: Reed, Holmes, Weyers & Jones: Practical skills in biomolecular sciences, 4th edition, Pearson, 2013.

You can check the availability of the course books via [this link](#)

**Assessment methods and criteria:**

Continuous assessment (home works, lab reports), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Kaija Autio

**Working life cooperation:**

No

**Other information:**

Location of instruction: lectures (in Finnish) at Linnanmaa campus, laboratory practicals at Kontinkangas campus. In webodi students register to course 740151 Biochemical methodologies I, 10 credits, only to those parts that do not belong only to biochemists.

## 740143P: Biomolecules for Biochemists, 8 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay740157P	Basic biochemistry 1: Biomolecules (OPEN UNI)	4.0 op
ay740152P	Basic biochemistry 1: Biomolecules (OPEN UNI)	5.0 op
740147P	Biomolecules for Bioscientists	8.0 op
740148P	Biomolecules	5.0 op

**ECTS Credits:**

8 credits

**Language of instruction:**

English and Finnish

**Timing:**

B.Sc yr1 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell the composition, structure and function of the major groups of biomolecules in cells; nucleic acids, proteins, carbohydrates and lipids and describe the forces that modulate their function.
- apply information in the right context and evaluate it critically
- In addition, students on the 8op versions are able to work in the biochemical laboratory, are able to solve calculations and problems and are able to interpret the scientific data they generate.

**Contents:**

This module provides an overview of biochemistry, outlining the forces involved in biomolecule structure and the chemical structures and properties of polynucleic acids, proteins, carbohydrates and lipids. There will also be an introduction to prebiotic evolution and writing of a synopsis on this subject. The module is arranged into lectures or workshops, computing and other exercises and laboratory work. All of the course materials are in English, but both English and Finnish are used in teaching. Both a final examination and continuous assessment will count towards the final mark and attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

30 h lectures, 32 h lab., plus exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Appling et al. Biochemistry – Concepts and Connections (2nd edition, 2019)  
Pearson Education Limited; ISBN 10: 1-292-26720-8, or equivalent

**Assessment methods and criteria:**

Continuous assessment, final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.



**Grading:**

1-5/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: lectures and computing at Linnanmaa campus, wet labs at Kontinkangas campus

**740146P: Metabolism I, 6 op****Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Tuomo Glumoff**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay740158P	Basic biochemistry 3: Metabolis (OPEN UNI)	4.0 op
ay740154P	Basic biochemistry 3: Metabolis (OPEN UNI)	3.0 op
740149P	Metabolism I	4.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Lectures: Finnish, laboratory practicals: English

**Timing:**

B.Sc. yr1 spring

**Learning outcomes:**

Students will be able to explain the main principles of how the metabolism is made up, will get a detailed picture of the energy metabolism, and will be able to organize part of the wholeness of metabolism, particularly how energy metabolism is networked to the synthesis and degradation of biomolecules.

**Contents:**

On this course the central concepts and mechanisms of metabolism, its regulation and the integration of metabolic pathways will be introduced, like anabolism and catabolism, linking of different pathways, and metabolic regulation. Especially the energy metabolism will be studied, concerning carbohydrates, lipids and the respiratory chain. Combined with the course Metabolism II the students will get a good overview on the principles of metabolism, metabolic integration and the methods to study metabolism.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (28 h), problem-based exercises (workshops) 6 h, laboratory work (32 h, attendance obligatory), lab diary and final exam.

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Biomolecules, Biomolecules for Biochemists or Biomolecules for Bioscientists

**Recommended optional programme components:**

Biomolecules, Biomolecules for Biochemists tai Biomolecules for Bioscientists

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Problem-based exercises, laboratory work and a final exam will count towards the final grade.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail. Problem-based exercises, laboratory work and a final exam will count towards the final grade.

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**740145P: Physical Biochemistry, 6 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** André Juffer

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- define the relevance of theoretical concepts to the biosciences
- tell where various equations of physical biochemistry come from
- discuss the link between theory and experiment
- perform simple but realistic calculations

**Contents:**

This module will cover the concepts of thermodynamics and their application to biochemical systems plus chemical and enzymatic kinetics. Topics covered will include:

*Concepts of thermodynamics:* First, Second and Third Law of Thermodynamics. Heat. Work. Enthalpy. Entropy, Gibbs and Helmholtz free energy, Chemical potential, Chemical potential of a solute, Free energy and equilibrium.

*Applications of thermodynamics:* Chemical reactions, Protein-ligand association, Acids, bases and pH regulation, Acid-dissociation constants, introduction to thermodynamics of protein folding.

*Chemical kinetics:* Basic chemical reactions and single step reactions, Applications of chemical kinetics to multistep reactions, Catalysis and enzyme kinetics.

Attendance of some parts of the course is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h le and exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended books:

Price NC *et al.*, *Principles and problems in Physical chemistry for Biochemists*, Third edition, Oxford University Press, Oxford, 2001.

Atkins P and De Paula J, *Physical chemistry*, 8ed, Oxford University Press, Oxford, 2006.

Atkins P and de Paula J. *Physical chemistry for the life science*, Oxford University Press, Oxford, 2006.

**Assessment methods and criteria:**

Homeworks, workshops, no exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

André Juffer

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

## 740150P: Transferable skills for biochemists, 2 op

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

2 credits

**Language of instruction:**

Finnish

**Timing:**

BSc yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- process gel photographs taken in practicals and embed them into lab reports
- use Microsoft Word to write reports
- create standard curves using Microsoft Excel
- explain how to construct a good oral presentation
- list the basics of good scientific practice

**Contents:**

On overview is given of a commonly used word processor (Microsoft Word) and spreadsheet (Microsoft Excel). Students will be taught to use these software to create lab reports (word processing, gel photograph processing and embedding in lab reports). Other topics are the basics of oral presentation, ethics in scientific research and good scientific practice. Attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures and computer practicals all together 14 hr, home exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended reading: Reed, Holmes, Weyers & Jones: Practical skills in biomolecular sciences, 4th edition, Pearson, 2013.

You can check the availability of the course books via [this link](#)

**Assessment methods and criteria:**

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa, partly Kontinkangas

## 740376A: Bachelor's Thesis, 10 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

10 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr3 autumn

**Learning outcomes:**

Students should be able to execute a project to produce a thesis type of output, be well aware of current research trends in biochemistry, be able to critically select knowledge from the literature, be able to discuss and debate scientific results, and be able to choose and evaluate proper form of presentation for each purpose.

**Contents:**

The theme of the module is public understanding of science and the reporting of biochemical research using different methods and for different audiences. During the course students will learn on a general level about different fields of biochemistry and their specific questions, orientation of biochemical research and organization of research into projects. Practical exercises will contain presenting of a given subject in different forms, which may be a talk, a short article, a poster, a press release or a research proposal. A literature report will be written as well as a popularized presentation of it. In addition the course is linked to the module Ruotsin kieli (Swedish language).

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 hr lectures and practicals, web-based learning and self study

**Target group:**

Major students

**Prerequisites and co-requisites:**

Course is for BSc yr3 students

**Recommended optional programme components:**

Information skills 030005P can be taken as a part of Bachelor's thesis course

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Writing and presentation of BSc thesis.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

## 740362A: Cellular Biology, 6 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Henrika Honkanen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740323A Cell culture course 3.0 op

744610S Advanced course for cell biology 3.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Lectures: Finnish and English Laboratory Practicals: English

**Timing:**

B.Sc. yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- interpret and analyze the general molecular mechanisms of cell functions
- plan how such molecular mechanisms can be studied in vitro and in vivo
- track the molecular defects that might be responsible for abnormal functioning of cells e.g. in disease states

**Contents:**

The aim of the course is to deepen the knowledge about where in the cell different biochemical reactions take place, how the molecules are trafficked between organelles, and how these phenomena can be studied in cultured cells. The course aims to address specifically the specific functions of the organelles in an eukaryotic cell, transport of material into and out of the cells, and how the cytoskeleton serves many of these functions. The course contains practical lab work, during which the students learn basic skills on cell culture and fluorescence microscopy. The practical course is compulsory for the Biochemistry students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures, 40 h lab

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cell biology, Biomolecules for biochemists, Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lodish, et al., Molecular Cell Biology (partly), 4th edition. W.H. Freeman and Company

**Assessment methods and criteria:**

Lab reports, final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Henrika Honkanen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

## 740366A: Cellular Communication, 6 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- name, list and discuss the major intra- and intercellular signalling pathways
- present, describe and discuss characteristic features of signalling pathways
- describe how to study, examine and analyse signalling pathways

**Contents:**

The course covers basic aspects of the main cellular signalling pathways. The main emphasis will be made on the signalling pathways involved in the action of various hormones, growth factors, lipid-derived signaling molecules, and their cell surface and intracellular receptors, intracellular second messengers and protein kinases and phosphatases. The course involves a 40 h practical course (+written reports) in which cultured cells are used as targets to visualize certain hormone or drug-induced signaling molecules, their interactions, and how these regulate e.g. normal cell growth and/or cell death in culture. Attendance at practical course is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 32 h practicals

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Laboratory practicals, final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

## 740372A: Final Examination, 6 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 autumn-spring

**Learning outcomes:**

Upon successful completion students are able to:

- present the full breadth of the core topics of biochemistry
- Integrate material from multiple sources

**Contents:**

This examination will test the ability of students to integrate knowledge from the core biochemistry modules they have taken during their BSc. It will include questions covering the material from Biomolecules for Biochemists, Biochemical methodologies I, Physical biochemistry, Metabolism I, Molecular biology I, Cellular biology, Microbiology, Protein Chemistry I, Cellular communication and Metabolism II. The questions will require an understanding of the basic principles of biochemistry and each will be based on subject specific material from at least two modules.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Student self-study

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Renata Prunskaitė-Hyyryläinen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**740377A: Maturity test (B.Sc. degree), 0 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**ECTS Credits:**

0 credits

**Timing:**

BSc yr3 spring

**Learning outcomes:**

After BSc maturity test student is able to write a logical and analytical summary of his BSc thesis.

**Contents:**

Maturity test (B.Sc.) will be written in the topic of B.Sc. thesis. In the test student proves to command both the subject of B.Sc thesis and native language.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students

**Assessment methods and criteria:**

An essay written under invigilation (500 words, will be written electronic in Exam-system in the Examinarium).

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

-

**740367A: Metabolism II, 6 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lauri Eklund**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740375A Metabolism II 4.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

Students should be able to outline in detail how cells use various small and large molecules, how cells synthesize and degrade metabolites for their needs, and how metabolic network is connected and integrated.

**Contents:**

Metabolism II completes the discussion of energy metabolism by combining it with metabolism of nitrogen-containing compounds and synthesis and degradation of different biomolecules, as well as extends the analysis of the central concepts and mechanisms of metabolism. It will be seen how the metabolic pathways that were examined separately will be connected to each other and regulated. Some chemical mechanisms of pathways as well as ways to supply precursors for the main stream pathways will be handled. Special aspects of metabolism, like tissue specificity and physiological states, will also be studied. Photosynthesis is studied as continuation to energy metabolism.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures 29h, workshops 27h, 4 workshop reports, final exam. Attendance at workshops is obligatory.

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Metabolism I

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (homeworks, workshops), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Lauri Eklund

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa

**740363A: Microbiology, 6 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Pospiech, Helmut**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

740374A Microbiology 3.0 op

740322A Microbiology 3.0 op

740324A Laboratory course in microbiology 3.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**



English

**Timing:**

B.Sc. yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- define the typical features of bacteria, archaea, fungi and virus and explain the diversity of different groups of microorganisms
- explain the basic aspects of microbial metabolism
- understand the basics of microbial growth, enrichment, culture and growth control both in the environment and in contained culture
- explain the essential roles of microorganisms in our environment
- apply their knowledge for the growth and its control of standard laboratory microorganisms
- have a basic understanding of the industrial use of microorganisms or microbial compounds.

**Contents:**

This module is an introduction to general and applied microbiology and consists of lecture and laboratory exercises. In the lectures, the diversity and classification of microorganisms, especially bacteria will be introduced. Further topics are the structure and function of the prokaryotic cell, bacterial growth, metabolism and physiology, the importance of bacteria in different ecosystems as well as the industrial use of bacteria. The exercises introduce basic microbiological methods and techniques for the aseptic work. These include culture on solid and in liquid media, transfer of bacteria by streaking or spreading, the use of dilution and enrichment techniques, the inhibition of bacterial growth, measurement of bacterial growth and death, and finally the basics of transformation and bacteriophage infection and its use in molecular biology. Attendance at practical course is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 hours lecture and 60 hours laboratory exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

Biomolecules for Biochemists and Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

M. Salkinoja-Salonen (ed.) (2002) Mikrobiologian perusteita, Helsingin yliopisto; Michael T. Madigan, John M. Martinko, Paul V. Dunlap, and David P. Clark Parker (2010) Brock biology of microorganisms, 12th ed. Prentice Hall International. Microbiology laboratory exercises, Dept. Biochemistry (2010).

**Assessment methods and criteria:**

Continuous assessment (home works, lab reports), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Helmut Pospiech

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

## 740361A: Molecular Biology I, 8 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Mirva Saaranen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740373A Molecular Biology I 4.0 op

740318A Molecular Biology 4.0 op

740337A Laboratory Course in Molecular Biology 3.0 op

**ECTS Credits:**

8 credits

**Language of instruction:**

Lectures: Finnish, laboratory practicals: English

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

After this course students should understand the basics of molecular biology and be able to use modern molecular biology methods.

**Contents:**

The course covers gene structure, DNA replication, recombination, transcription, translation and basics of gene expression. The student will learn the most common recombinant DNA techniques, such as PCR, use of restriction endonucleases, preparation of recombinant plasmids and DNA sequencing. Attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 4 h computer exercise, 80 h lab, homeworks. Laboratory and computer practicals are compulsory

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Cellular biology, Biomolecules for Biochemists and Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Mathews, CK, van Holde KT, Applins DR, Anthony-Cahill SJ: Biochemistry (4th edition). Optional.

**Assessment methods and criteria:**

Homeworks 35 %, lab reports 30 % and final exam 35 %.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail.

**Person responsible:**

Mirva Saaranen and Henrika Honkanen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**740386A: Physiological biochemistry, 5 op**

Voimassaolo: 01.01.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Kalervo Hiltunen

Opintokohteen kielet: English, Finnish

**Leikkaavuudet:**

740371A Physiological Biochemistry 4.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English / Finnish

**Timing:**

B.Sc. yr2-3 spring

**Learning outcomes:**

Aim of the course is to get students familiar with :

- Specific aspects of human biochemistry
- Structure, tasks and function of different organs
- Systemic and intracellular regulation of metabolism

- Functional and regulatory relations of different organs

**Contents:**

Lectures include information about morphology, function and role in metabolism of adipose tissue, kidney, muscle tissue and cytoskeleton, alimentary system and liver. They also focus on structure of biomembranes, composition and function of endocrine system, hormone synthesis and signal transduction. Mechanisms of action of hormones (especially steroid hormones), their cell surface and intracellular receptors, second messengers and other regulatory molecules will be discussed.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 2 h seminars, 10 h laboratory work and home work. Seminars, home work and laboratory work are compulsory.

**Target group:**

Major students

**Prerequisites and co-requisites:**

Basic biochemistry, cellular and molecular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

Murray et al. Harpers' Illustrated Biochemistry (29<sup>th</sup> edition)

**Assessment methods and criteria:**

Home work and final exam

**Grading:**

1-5/fail

**Person responsible:**

Kalervo Hiltunen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**740364A: Protein Chemistry I, 8 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Rajaram Venkatesan

**Opintokohteen kielet:** English

**ECTS Credits:**

8 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell the relevance of protein structure, including post-translational modification, to protein function
- describe the techniques available to purify proteins and to study protein function and have an appreciation of the applications and limitations of these techniques
- analyze a wide range of biochemical data and solve problems relating to the interpretation of data concerning protein function and basic structural characterization

**Contents:**

This module provides more detailed information on the chemistry of proteins. Topics covered include protein purification, reversible and irreversible covalent modifications of proteins, protein translocation, protein degradation, an introduction to the protein folding problem, protein structure analysis, basic enzyme catalysis mechanisms and co-enzymes. The module includes lectures, continuous assessments, group works, student presentations, and laboratory exercises. Final examination, lecture attendance/ continuous assessments, presentations and laboratory reports will all count towards the final mark. Attendance at laboratory exercises is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures including student presentations, 80 h lab, exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

Biomolecules for Biochemists, Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended reading": Greighton: Proteins, Structure and Molecular Properties, W.H. Freeman & Co, 2002 (2nd ed.)

**Assessment methods and criteria:**

Presentation, lab reports, attendance / continuous assessment

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Rajaram Venkatesan

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures at Linnanmaa campus, laboratory exercises at Kontinkangas campus.

## 780117P: General and Inorganic Chemistry A, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

**ECTS Credits:**

5 credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain organic and inorganic chemistry fundamentals, basic concepts and terminology.
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

30 hours of lectures and applications, 20 hours of exercises and 85 hours of self-study.

**Target group:**

Biochemistry, Chemistry compulsory. In the entity of 25 credits (minor studies), compulsory.  
Physical sciences, Mathematical sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 1-6, 14.2, 15-18.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Johanna Havia

**Working life cooperation:**

No

**Other information:**

No

**780118P: General and Inorganic Chemistry B, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain inorganic chemistry fundamentals, basic concepts and terminology
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

Thermodynamics, reaction kinetics, electrochemistry, electrons in atoms, periodic table, chemical bond, intermolecular forces.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

32 hours of lectures and applications, 18 hours of exercises, 85 hours of self-study.

**Target group:**

Biochemistry, Chemistry, compulsory. In the entity of 25 credits (minor studies), compulsory.  
Physical sciences, Mathematical sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 7-11.1- 11.7, 12.1, 13, 19-20.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Matti Niemelä

**Working life cooperation:**

No

**Other information:**

No

## 780116P: Introduction to Organic Chemistry, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay780116P	Introduction to Organic Chemistry (OPEN UNI)	5.0 op
780103P2	Organic Chemistry I	6.0 op
780108P	Basic Course in Organic Chemistry	6.0 op
780112P	Introduction to Organic Chemistry	4.0 op
780103P	Introduction to Organic Chemistry	6.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish. Book-examination in English as well.

**Timing:**

1st spring

**Learning outcomes:**

After this course, the student:

- can recognize and name basic organic compounds and explain their properties.
- can explain organic chemistry basic concepts.
- can deduce basic reaction types and solve their mechanisms.

**Contents:**

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

38 hours of lectures plus 12 hours of exercises, 84 hours of independent self-study.

**Target group:**

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Hart, H.: Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999; Hart, H. ja Hart, D.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999 and material in Moodle.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Johanna Kärkkäinen

**Working life cooperation:**

No

## 780123P: Introductory Laboratory Works in Chemistry, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780127P Principles of Chemistry Labwork 5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn or 1st spring

**Learning outcomes:**

After this course, the student can apply laboratory safety instructions and act accordingly. He/she can communicate by using basic laboratory terminology, identifies basic laboratory equipment and can use them properly. He/she recognizes the importance of the planning of the laboratory work. The student is able to utilize the basic chemistry techniques and determination methods in the given task. Furthermore, the student can also make laboratory notes and write a report on the performed task.

**Contents:**

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, problems related to the studied determination methods, keeping a laboratory notebook, writing a report.

**Mode of delivery:**

Supervised laboratory work, independently done preparatory problems and reports.

**Learning activities and teaching methods:**

Safety in laboratory 2 hours, 40 hours of laboratory works, 93 hours of self-study.

**Target group:**

Biochemistry, Process Engineering, Environmental engineering, compulsory. In the entity of 25 credits: compulsory. Physical Sciences, Geology, Mathematical Sciences, Biology: optional.

**Prerequisites and co-requisites:**

Basic Principles in Chemistry (780120P, 5 cr) or General and Inorganic Chemistry A (780117P, 5 cr). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

**Recommended optional programme components:**

Participation in the courses General and Inorganic Chemistry A (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr).

**Recommended or required reading:**

Instruction Book (in Finnish)

**Assessment methods and criteria:**

Accomplishment of the course requires accepted preparatory problems, laboratory exercises and problems related to them.

**Grading:**

The course utilizes verbal grading scale pass/fail.

**Person responsible:**

Teija Kangas

**Working life cooperation:**

No

**Other information:**

Attendance at the lecture of Safety at work is compulsory.

**757122P: Concepts of genetics for biochemists, 3 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Heikki Helanterä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

757109P Concepts of genetics 5.0 op

**ECTS Credits:**

3 ECTS cr / 81 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

Accordind to biochemistry students scedule.

**Learning outcomes:**

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

**Contents:**

Part 1. Mendelian genetics, including the basic of quantitative and population genetics and Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures and seminars, 57 h independent studies, exam.

**Target group:**

Biochemistry students: parts 1 and 3 (3 cr) compulsory.

**Prerequisites and co-requisites:**

Introductio to cell biology and physiology (750122P) or equivalent knowledge.

**Recommended optional programme components:**

This course is prerequisite to all other genetics courses.

**Recommended or required reading:**

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed or later). Pearson, 896 p. Alberts, B. et al.

2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

**Assessment methods and criteria:**

Exam, home work assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail.

**Person responsible:**

Assoc. Prof. Heikki Helanterä.

**Working life cooperation:**

No.

**Other information:**

-



**750122P: Introduction to cell biology and physiology, 5 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Häggman, Hely Margaretha**Opintokohteen kielet:** Finnish**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.S. 1st autumn.

**Learning outcomes:**

Students will acquire comprehensive understanding of how an organisms function on molecular, cell and physiological level.

**Contents:**

The course has been divided into four section: animal- and plant cell biology, genetics, and animal physiology.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

40 hours of lecture and hours of independent learning.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Molecular Biology of the Cell (Alberts et al.)

Biology: a global approach (Campbell ym.)

**Assessment methods and criteria:**Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

Numerical grading scale 0 – 5, where 0 = fail. Final grade is average value of the exams.

**Person responsible:**

Prof. Hely Häggman and Dr. Sanni Kinnunen.

**Working life cooperation:**

No.

**Other information:**

-

*Compulsory***750122P-01: Introduction to cell biology and physiology, genetics, 0 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Häggman, Hely Margaretha**Opintokohteen kielet:** Finnish**750122P-04: Introduction to cell biology and physiology, animal physiology, 0 op**

**Voimassaolo:** 01.08.2020 -  
**Opiskelumuoto:** Basic Studies  
**Laji:** Partial credit  
**Vastuuyksikkö:** Field of Biology  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Häggman, Hely Margaretha  
**Opintokohteen kielet:** Finnish

**750122P-03: Introduction to cell biology and physiology, plant cell biology, 0 op**

**Voimassaolo:** 01.08.2020 -  
**Opiskelumuoto:** Basic Studies  
**Laji:** Partial credit  
**Vastuuyksikkö:** Field of Biology  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Häggman, Hely Margaretha  
**Opintokohteen kielet:** Finnish

**750122P-02: Introduction to cell biology and physiology, animal cell biology, 0 op**

**Voimassaolo:** 01.08.2020 -  
**Opiskelumuoto:** Basic Studies  
**Laji:** Partial credit  
**Vastuuyksikkö:** Field of Biology  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Häggman, Hely Margaretha  
**Opintokohteen kielet:** Finnish

**806119P: A Second Course in Statistics, 5 op**

**Voimassaolo:** 01.06.2015 -  
**Opiskelumuoto:** Basic Studies  
**Laji:** Course  
**Vastuuyksikkö:** Field of Mathematics  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Jari Päckilä  
**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

**ECTS Credits:**

5 ECTS credits

**Language of instruction:**

Finnish

**Timing:**

4th period

**Learning outcomes:**

Upon completion of the course, student will be able to:

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles
- implement and interpret analyses of a statistical software concerning issues of the course.

**Contents:**

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

**Target group:**

Minor students

**Prerequisites and co-requisites:**

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

**Recommended optional programme components:**

After the course, student is able to continue other statistics courses.

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Mid-term exams and/or final exam and possible homework.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Jari Pääkkilä

**Working life cooperation:**

No

## 806118P: Introduction to Statistics, 5 op

**Voimassaolo:** 01.06.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Mathematics

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jari Pääkkilä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

**ECTS Credits:**

5 ECTS credits

**Language of instruction:**

Finnish

**Timing:**

3rd period

**Learning outcomes:**

After completing the course, student will be able to:

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

**Contents:**

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection

- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

**Target group:**

Minor students

**Recommended optional programme components:**

After the course, student is able to continue to A Second Course in Statistics.

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Mid-term exams and/or final exam and possible homework.

**Grading:**

Fail, 1-5

**Person responsible:**

Hanna Heikkinen and Jari Päckilä

**Working life cooperation:**

No

**746103P: Basic studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746609M: Studies in other universities/institutes, 0 - 50 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Other Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

### **H325430: Recommended optional studies - BSc Int exchange, 4 - 30 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

#### *Electives*

#### **781305A: Organic Chemistry I, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780389A Organic Chemistry I 6.0 op

780385A Organic Chemistry I 9.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

2nd autumn

**Learning outcomes:**

After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.

**Contents:**

Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

40 hours of lectures, 94 hours self study

**Target group:**

Chemistry, compulsory. In the entity of 60 credits, compulsory.

**Prerequisites and co-requisites:**

Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Juha Heiskanen

**Working life cooperation:**

No

**780119P: Introduction to Analytical Chemistry, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780111P Introduction to Analytical Chemistry 4.0 op

780110P Analytical Chemistry I 5.5 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

2nd autumn

**Learning outcomes:**

Upon completion the student should have acquired knowledge and understanding of basic concepts of quantitative chemical analysis employing classical methods of analysis.

**Contents:**

Steps in quantitative analysis, statistical evaluation of analytical data, chemical equilibrium in aqueous solutions, gravimetry, titrimetry, spectrophotometry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

30 hours of lectures + 20 hours of exercises + 84 hours of self-study

**Target group:**

Chemistry, compulsory. In the study entity of 25 credits compulsory.

Mathematical Sciences, Physical Sciences, optional.

**Prerequisites and co-requisites:**

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P), or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), or Basic Principles in Chemistry (780109P).

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Harvey, D.: Analytical Chemistry 2.0-an open-access digital textbook (can be loaded from Internet).  
Saarinen, H. ja Lajunen, L.H.J.: Analyttisen kemian perusteet, Oulun yliopistopaino, 2004.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Paavo Perämäki

**Working life cooperation:**

No

**030005P: Information Skills, 1 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credit / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period III;  
biochemistry 3. autumn semester;  
biology 3. autumn semester, period I;  
chemistry 3. autumn semester, period I;  
civil engineering 2. spring semester, period IV;  
computer science and engineering 2. spring semester, period IV;  
electronics and communications engineering 3. spring semester;  
geosciences 2. spring semester, period IV;  
geography 3. semester, periods I and III;  
industrial engineering and management 3. year;  
information processing sciences 1. or 3. year;  
mathematics and physics 1. spring semester, period III;  
mechanical engineering 3. year;  
mining engineering and mineral processing 3. year;  
process and environmental engineering 2. year, period II;  
Master's degree students in industrial engineering and management 1st year.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool.

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

Training sessions 8 h, group working 7 h, self-study 12 h

**Target group:**

Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology and Faculty of science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Recommended optional programme components:**

In biochemistry the course is completed as a part of 740376A Bachelor's Thesis.

**Recommended or required reading:**

Web learning material [Tieteellisen tiedonhankinnan opas](#)

**Assessment methods and criteria:**

Passing the course requires participation in the training sessions and successful completion of the course assignments.

**Grading:**

pass/fail

**Person responsible:**

Ursula Heinikoski

**780329A: Laboratory Course I in Organic Chemistry, 4 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Juha Heiskanen, Johanna Kärkkäinen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

781307A Laboratory Course I in Organic Chemistry 5.0 op

Ei opintojaksokuvauksia.

**740074Y: Tutoring/confidential posts, 1,5 op**

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jari Heikkinen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

1.5 credits

**Contents:**

For this study a student acts as a tutor for a group of new students, as a member of Working group on development of teaching (OKTR) or as a member of working committee of OKTR .

**Learning activities and teaching methods:**



10-20 h tutoring of a small group, autumn yr2-yr3, activity in Working group on development of teaching (OKTR) or in working committee of OKTR. Optional.

**Target group:**

Small group tutors

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Education designer

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa, Kontinkangas

### **H325436: Other Optional studies - BSc, 0 - 50 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Set optional amount of credits in "Schedule"*

### **740387A: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Caglar Elbuken

**Opintokohteen kielet:** English

**ECTS Credits:**

5-7 credits

**Language of instruction:**

English

**Timing:**

Autumn

**Learning outcomes:**

The students are expected to learn the fundamentals of micro/nanofluidics and be able to apply those concepts to several applications. Another major goal of the course is to give the students enough tools so that they can follow the state-of-the-art developments in the field from the leading journals such as RSC Lab on a Chip, Wiley Small, ACS Analytical Chemistry. The students are also very briefly exposed to the recently growing field of nanofluidics through comparisons between micro and nano-scale physics. The students will be introduced with the biosensors and their operating principles

**Contents:**

The goal of this course to cover the fundamentals and the latest developments in the field of micro/nanofluidics and their application areas in sensing and diagnostics. The first half of the course (modules 1-6 below) is intended to cover the fundamental fluidic concepts. The second half of the course (modules 7-12) covers the application areas of microfluidic and LOC systems, such as biosensors and point-of-care diagnostic devices. Finally, the trending topics in the field are covered.

For students interested in a hands-on experience, an extended module with multiple laboratory sessions is available (option-2). The lecture is a pre-requisite to take the laboratory practice session.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures + online exercises

**Target group:**

BSc and MSc level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

In-class quizzes, homework, term project, final exam

**Grading:**

1-5/fail

**Person responsible:**

Caglar Elbuken

**Working life cooperation:**

-

**Other information:**

Location of instruction: Kontinkangas campus

**740383A: Orientation to research work, 0 - 6 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Intermediate Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** Finnish, English**ECTS Credits:**

0-6 credits

**Language of instruction:**

Finnish/English

**Timing:**

BSc yr1-3

**Learning outcomes:**

**Learning outcomes:** After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to research work via the active integration of students into research groups and/or via one to two week advanced practical courses. The integration into groups can be either full-time or part-time research work, with 1.5op being awarded for each full-time week equivalent worked. A maximum of 6op can be awarded for working in one research group. The research groups do not need to be in the Faculty of biochemistry and molecular medicine, University of Oulu, but advance permission should be sought if the research group is not part of the University of Oulu.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students (BSc)

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

Pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

Optional course. The maximum sum of credits from courses 740382A and 740383A is 6 credits.

**740382A: Orientation to biochemical work, 0 - 6 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English, Finnish

**ECTS Credits:**

0-6 credits

**Language of instruction:**

Finnish/English

**Timing:**

BSc yr1-2

**Learning outcomes:**

After this course student has gained experience of practical work done in non-research group environment. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to non-research work in companies or other suitable environment. The work can be either full-time or part-time work, with 1.5op being awarded for each full-time week equivalent worked. A maximum of 6op can be awarded for working in one work placements. Each placement must be agreed in advance with the responsible person.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Non-research work

**Grading:**

Pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

Optional course. The maximum sum of credits from courses 740382A and 740383A is 6 credits

**740381A: Biochemical and biomedical innovation, 2 - 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

2-5 credits

**Language of instruction:**

English

**Timing:**

Can be taken by any BSc / MSc / PhD student

**Learning outcomes:**

The aim of the course is to get student familiar with:

- the core skill set required to recognize opportunities/needs and how to validate creative ideas
- the core skill set of searching patent databases
- the concepts of intellectual property rights (IPR)
- the concepts of how to pitch an idea

**Contents:**

This module covers basic aspects of the key skills required for successful innovation in the field of biochemistry and molecular medicine. Concepts relating to how to recognize opportunities, how to recognize what is needed in the field, creative thinking, validating ideas and how to pitch ideas are covered as well as an introduction to intellectual property rights and patent searching. In addition to workshops /seminars (19 hours) the 5 ECTS version of course requires submission of an invention disclosure/proof of concept funding or submission of an entry to the biochemistry and molecular medicine innovation award.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

19 hours of lectures/workshops

**Target group:**

Major students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

For 2 ECTS participation in at least 70% of seminars/workshops. For 5 ECTS participation in at least 70% of the seminars/workshops plus submission of an invention disclosure / proof of concept funding application to the university (PhD students) or submission of an entry to the biochemistry and molecular medicine innovation award (BSc and MSc students).

**Grading:**

Pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**740078Y: Working life course, 6 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Henrika Honkanen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

6 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr1-3 spring

**Learning outcomes:**

Upon successful completion students are able to

- describe transferable working life skills, independent of the working environment
- recognize and describe their own skills
- assess themselves as an expert, as an applicant and as an employee
- recognize those working life skills which may need improvement
- compose their "skill profile"

**Contents:**

Workshops will address the generic working life skills which are needed in every working environment. Communication, social interaction, group work, organizing, time management, giving and receiving feedback are among the topics studied. The skills and experiences the students have obtained already, will be recognized and considered in terms of how to best present them when applying for a job for instance. The summer job, which needs to last at least 1 month, can be of any branch. During the summer job, the students will have assignments concerning working life related issues, e.g. safety, working environment or interactions between people at the working place. By the end of the course the students will write a report to describe their experiences reflecting the development of their working life skills. Reports will be evaluated by the teacher and also by a fellow student. Thus also giving constructive feedback to a fellow student will be practiced.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Three workshops (3 x 2-3h) are organized during the Spring before the summer job and one in the Autumn. A small part of the teaching in workshops is lecturing, mostly learning takes place via group work, discussions and assignments. The summer job (min. 1 month) is accompanied with assignments and a final report. Evaluation of a report from a fellow student is included.

**Target group:**

B.Sc. students

**Prerequisites and co-requisites:**

Summer job for at least 1 month. The field of work is not specified.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Info on recommended reading will be given in workshops.

**Assessment methods and criteria:**

Participation in the workshops, summer job, assignments, report, evaluation.

**Grading:**

Pass/Fail

**Person responsible:**

Henrika Honkanen

**Working life cooperation:**

Yes

**Other information:**

Location of workshops (Kontinkangas/Linnanmaa campus) will be announced separately.

**Voimassaolo:** 01.01.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish, English

**ECTS Credits:**

1-10 ECTS

**Language of instruction:**

Finnish/English

**Timing:**

During academic studies

**Learning outcomes:**

Upon completion of the course, the student will be able to

- apply the skills needed in academic positions of trust (interaction skills, meeting techniques, working in a group, cooperation skills, leadership skills)
- evaluate critically the issues to be decided, take a stand on them and justify his or her viewpoint
- attend to the functions related to his or her position of trust in a responsible manner

**Contents:**

The course can include functions in a number of positions of trust as follows:

- Student Union Board, 1 year, 4-5 credits
- Student Union representatives, 2 years, 2 credits
- University Board of Directors, 1 year, 2 credits
- University Collegium, 2 years, 2 credits
- Education Council, 1 year, 2 credits
- Faculty Board, 2 years, 2 credits
- Board of a subject organization or a student guild, 1 year, 1-3 credits
- National student organization such as SYL, 1 year, 1-5 credits
- Other important functions in the field of education policy and/or development of teaching, such as Education Committee or section of the Student Union, 1-3 credits

The number of credits to be awarded to the student is determined by the Dean of Education based on available documentation following the principles mentioned above.

**Mode of delivery:**

Independent work

**Learning activities and teaching methods:**

Independent report

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The student shall write a learning diary of the position(s) of trust that she or he has been managing, discussing the following issues:

1. Which organization has the student been working in, how long and how actively has s/he been taking part in its activities?
2. What does the student think s/he has learnt from the position of trust? (With special consideration of these working life skills: communication skills, social skills, technical skills, international competence, commercial and financial competence, development of self-knowledge)

3. How can the student make use of his or her experience in the future?
4. In the student's mind, how should the preparation of matters be developed?

The learning diary and proof of having been in charge of a position of trust are returned to the Chief Academic Officer of the Faculty who will determine the number of credits to be awarded. The length of the learning diary is 2 – 5 pages (font 11, line spacing 1).

**Grading:**

Pass/fail

**Person responsible:**

Dean of Education Tuomo Glumoff

**Working life cooperation:**

Active participation in student organizations and in University decision making develops generic working skills.

**Other information:**

The maximum number of credits for the activities mentioned above is 10 credits in one to two parts. The credits can be included in general studies

**ay724102P: Management and Organizations (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724102P Management and Organizations 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

Upon completion of the course, the student will be able to distinguish the concepts related to organization, organizing as well as managerial and entrepreneurial work. This understanding helps the student's ability to identify organizational processes in everyday work-life interventions and to list the possible change factors within a chosen organization. The student is also able to identify different kinds of organizations and can define the different principles of management styles. The student is able to understand various ongoing functions within organizations and their requirements for the organizations' management. The student understands the role of organizational development and learns to register the most essential challenges of management in the current organizations.

**Contents:**

The course covers the topics and questions of organizations and management, human organizing and processes as well as change management. The premises of the course are the traditional management schools of thought (scientific management, human relations school of thought, Hawthorne-studies, etc.) that the course goes through thoroughly. The course builds the newest questions of organizational theoretical approaches (change, processuality, etc.) on this understanding. In the course the students are introduced with the development of organizations and management, by presenting different organization types and management styles as well as the ways how those issues affect organization functioning.

**Mode of delivery:**

lectures, visiting lecturers, case-practices and group works.

**Learning activities and teaching methods:**



lectures (36 hours, including case-practices and group work of 9 hours), reading the course material (45 hours), preparation for the exam (52 hours).

**Recommended or required reading:**

Gareth Morgan (1997 tai uudempi). [Images of organization](#). London: Sage Publications.  
Hannele Seeck (2012 tai uudempi). [Johtamisopit Suomessa](#). Helsinki: Gaudeamus.  
Luentomateriaali.

**Assessment methods and criteria:**

Written exam of lectures and literature.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppsy.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724105P: Management Accounting (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724105P Management Accounting 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After passing the course, the student knows the basic cost concepts and the elements of cost accounting systems. Students are also able to apply the basic cost information in the company's decision making and explain which costs should be included in these calculations under different circumstances.

**Contents:**

Theoretical framework for understanding cost accounting, cost concepts, cost recording, different product costing methods, cost-volume-profit analysis, using cost accounting information in decision making.

**Learning activities and teaching methods:**

20 h lectures, 16 h exercises and independent reading of study materials (97 hours).

**Target group:**

Major students in economics and business administration

**Recommended or required reading:**

[Drury, C.: Management and cost accounting, 7th or 8th ed. Cengage Learning EMEA. Chapters 1-11 \(8th ed.\);](#)

Supplementary material: [Järvenpää, M.- Lämsiluoto, A - Partanen, V. – Pellinen, J.: Talousohjaus ja kustannuslaskenta, WSOYpro, chapters 1-8.](#)

**Assessment methods and criteria:**

Lectures and literature examination.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Working life cooperation:**

Understanding of management accounting systems is typically an important part of work for graduates in economics and business administration and an essential part of occupations like management accountant or controller.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppsy.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724108P: Financial Markets (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724108P Financial Markets 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4

**Learning outcomes:**

The course is an introduction to the role and functions of financial markets and institutions. Upon successful completion of the course, the student will be able to describe the basic structure and operational principles of financial markets and to identify different types of financial instruments and their characteristics.

**Contents:**

1) the role of financial markets and institutions in the economy, 2) main types of financial assets, their properties, and basics of pricing, 3) stock markets, bond markets, markets for bank obligations, treasury securities markets, derivative markets, mutual funds, private equity

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (26 h), visiting lectures (10 h), self-study (94 h), exam (3h)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

[Pilbeam: Finance & Financial Markets \(3<sup>rd</sup> edition\), Palgrave Macmillan](#)

Other material announced during the lectures

**Assessment methods and criteria:**

Examination, lecture diaries

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Prof. Juha-Pekka Kallunki

**Working life cooperation:**

General knowledge of the functions of financial markets and the various market participants

**Other information:**

The number of students is limited.

**ay724110P: Introductory Economics (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724110P Introductory Economics 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

Period A. It is recommended that students complete the course during the first autumn semester.

**Learning outcomes:**

After completing the course students (i) understand the basic concepts of economics and the rudiments of economic theory, (ii) can explain the determination of resource allocation and prices in a market economy, (iii) know how the aggregate economy operates in the short and long run, and (iv) how economic policy affects the Finnish economy and also the European economy.

**Contents:**

The course introduces students to the tools and ideas economics uses to describe and explain economic phenomena. The topics include:

- the long-term development of the Finnish and World economy
- basic ideas and principles of economics
- opportunity cost and comparative advantage
- market equilibrium: demand and supply
- how well does market economy work?
- firms and competition in market economy
- aggregate economic activity and its measurement
- business cycles
- monetary and fiscal policy
- economic growth

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

36 lectures including problem sets. Students are expected to do the problem sets on their own and familiarize themselves with the required and recommended materials (93 h). Mid-term exams (2) or Final exam (3 h).

**Target group:**

Sivuaineopiskelijat ja avoimen yliopiston opiskelijat

**Recommended or required reading:**

Material posted at the webpage.

Textbook: [Acemoglu, D., Laibson D. and List, J.A., Economics, 2015](#)

and extra readings: [Timothy Taylor, The Instant Economist. Everything You Need to Know About How the Economy Works. 2012. A Plume Book \(Penguin\), New York NY.](#)

Robert P. Murphy, Lessons for the Young Economist. Ludvig von Mises Institute 2010; [http://mises.org/books/lessons\\_for\\_the\\_young\\_economist\\_murphy.pdf](http://mises.org/books/lessons_for_the_young_economist_murphy.pdf)

**Assessment methods and criteria:**

Final Exam.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Marko Korhonen

**Working life cooperation:**

Students learn relevant and useful facts about the operation of the markets, and the aggregate economy to an extent that they can reasonably utilize those facts and knowledge in the decision making of the business they are working at.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724111P Finnish Economy and Economic Policy 5.0 op

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After the course the student is capable of outlining the economic history of Finland, to describe the position of Finland in the global economy and to evaluate the challenges of the Finnish economy now and the future. In addition, the student can describe the main features of the different areas in the Finnish economy.

**Contents:**

The course provides an overview of the Finnish economy and economic history, its current state and future development. The course deals with the activities of the Finnish economy and development, such as globalization, regional economy and general economic policy.

Lectures will include the following themes

1. The Finnish economy from the late 1800s to the early 2000s
2. Productivity and economic growth
3. Globalisation and Finland
4. Regional development and regional policy in Finland
5. Fiscal policy
6. Public economics and challenges of welfare state
7. Finance and economic development in communes
8. Innovations and innovation policy

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures, reading the course literature (93 h) and exam (4 h).

**Recommended or required reading:**

Announced by the lecturer.

**Assessment methods and criteria:**

Lecture- and literature examination and course assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkkyo.fi/fi/kauppatieteiden-sivuaeineopinnot-perusopinnot-25-op-oy-aya633707/>

**555225P: Basics of industrial engineering and management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Elina Jääskä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555225P	Basics of industrial engineering and management (OPEN UNI)	5.0 op
555221P	Introduction to Production	2.0 op
555220P	Basic Course in Industrial Engineering and Management	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Period 1.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe what industrial engineering and management (or operations management) means
- explain the core concepts of business operations and utilise these concepts in describing and analysing operations of an organisation
- explain in general terms the factors that affect economic performance of organisations
- utilise the terminology used in industrial engineering and management (operations management), describe the financial processes of companies and based on this describe the use of cost accounting in organisational decision-making
- calculate unit costs in various simplified settings, calculate various alternatives, as well as perform planning and goal oriented calculations based on given data, and draw conclusions based on the calculation results

**Contents:**

Operations and productivity, operations strategy, forecasting, accounting and cost accounting, investments and financial planning, sustainability, capacity management, location decisions, layout strategies, human resources management, supply chain management, subcontracting, inventory management, production planning, MRP & ERP, production scheduling, Just-in-Time & Lean operations, maintenance.

**Mode of delivery:**

Web-based teaching 20 hours / practices 14 hours / Independent studying 100 hours.

**Learning activities and teaching methods:**

Web-based lectures 20 h / exercises 14 h / self-study 100 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555285A Project management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture and exercise materials. Heizer, J. & Render, B. (2014) Operations management: sustainability and supply chain management, 11th ed. Pearson. In addition, recommended materials include Martinsuo, M. et al. (2016) Teollisuustalous kehittyvässä liiketoiminnassa chapters 7-9, 16 and 26.

**Assessment methods and criteria:**

This course utilises continuous assessment. During the course, there are seven mandatory weekly assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

MSc (Tech.) Elina Jääskä

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555220P Basic Course in Industrial Engineering and Management 3 ECTS cr and 555221P Introduction to Production 2 ECTS cr.

**555242A: Product development, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Haapasalo, Harri Jouni Olavi

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay555242A	Product development (OPEN UNI)	5.0 op
555240A	Basic Course in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

English.

**Timing:**

Periods 1-2.

**Learning outcomes:**

This course introduces product development and innovations management in a company environment. The course provides fundamental understanding over tools and frameworks that can be used for analysing and managing products, innovations, and technology development. The aim is to create a connection between product development and other company functions. Upon completion of the course, the student will be able to

- explain the role of product development as a company function
- understand the difference between innovation activities and systematic product development, and knows the difference between different phases of product development process and its activities
- transform customer needs into requirements for product development process and finally into product features
- define the meaning of other company functions to product development activities

**Contents:**

Meaning of products for the operations of an industrial enterprise, product development paradigm and defining relevant concepts, realising product development methodologically (U&E model, Cooper's stage-gate model, QFD), managing innovations, and product development success factors.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching.

**Learning activities and teaching methods:**

Lectures 20 h / exercises 6 h / group work and self-study 108 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

555226A Operations and supply chain management (Operations and production)

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Handouts, course work, and a collection of articles. Ulrich, K. & Eppinger, S. (2008) Product Design and Development. McGraw-Hill. 358 p.

**Assessment methods and criteria:**

Exam and group work.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Professor Harri Haapasalo.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555240A Basic Course in Product Development.

**555285A: Project management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555288A Project Management 5.0 op

ay555285A Project management (OPEN UNI) 5.0 op

555282A	Project Management	4.0 op
555280P	Basic Course of Project Management	2.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. Check the course in English 555288A Project Management.

**Timing:**

Period 2.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe explain the essential concepts and methods related to project management
- apply project management methods to create a schedule for a project and calculate critical path
- understand essential concepts related to project cost management and able to apply earned value method and three point estimate to manage project costs
- recognises the essential tasks of project risk management

**Contents:**

Defining project management, project goals and objectives, project phases and project life-cycle management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management, project stakeholder management, project communications management, the role of project manager, new modes of project delivery

**Mode of delivery:**

The tuition will be implemented as web-based teaching.

**Learning activities and teaching methods:**

Web-based lectures 16h, self-study 118h

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture material, exercise book, Artto, Martinsuo & Kujala 2006. Projektiliiketoiminta. WSOY

**Assessment methods and criteria:**

Weekly assignments and final online exam

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Assistant professor Kirsi Aaltonen



**Working life cooperation:**

Videos from the industry's projects

**Other information:**

Substitutes courses 555280P Basic Course of Project Management + 555282A Project Management.

**555264P: Managing well-being and quality of working life, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Arto Reiman

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555264P	Managing well-being and quality of working life (OPEN UNI)	5.0 op
555261A	Basic Course in Occupational Psychology	3.0 op
555262A	Usability and Safety in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Periods 3-4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- set targets and choose appropriate methods of developing well-being at work both at personal and organizational levels
- develop well-being at work in the contexts of labor legislation, good practices, productivity, occupational safety expertise, management and human resources
- know the key sources of information, typical goal-setting and management practices and the methods for assessing the performance at individual and organizational levels
- assess the economic impacts of well-being at work, especially in cases of work ability, occupational health, job satisfaction, occupational safety, productivity and the overall quality of working life
- know essential national and international regulation and strategic goal setting practices, good practices of the case companies, current trends, and methods in research.

**Contents:**

The course gives the student a vision of building sustainable, productive and satisfactory career. The contents cover the whole area of basic quality issues of working life analysing them in the following framework "Well-being at work means safe, healthy, and productive work in a well-led organisation by competent workers and work communities who see their job as meaningful and rewarding, and see work as a factor that supports their life management".

**Mode of delivery:**

The tuition will be implemented as blended teaching (web-based teaching and face-to-face teaching).

**Learning activities and teaching methods:**

Lectures 10 h / self-study 70 h / group work & exercises 42 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial Engineering and Management that also includes 555225P Basics of industrial engineering and management, 555285P Project Management, 555242A Product development, and 555286A Process and quality management.

**Recommended or required reading:**

Applicable parts of Arnold, J. et al. (2010), Work Psychology; Understanding Human Behaviour in the Workplace. 5th Edition. Financial Times/Prentice Hall and Aura, O. & Ahonen, G. Strate-gisen hyvinvoinnin johtaminen, Alma Talent. Other literature will be informed during the course.

**Assessment methods and criteria:**

This course utilises continuous assessment including exercises during the lectures (weight 20 %), group work (weight 40 %) and examination (weight 40 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr. Arto Reiman

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555261A Basic Course in Occupational Psychology + 555262A Usability and Safety in Product Development.

**555286A: Process and quality management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Osmo Kauppila

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555286A	Process and quality management (OPEN UNI)	5.0 op
555281A	Basic Course of Quality Management	5.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish.

**Timing:**

Period 4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- explain the role of process and quality management in a business organisation
- develop business processes based on the principles of quality management and appropriate tool

**Contents:**

Foundations of total quality management, planning of quality, performance measurement, process management, people management in relation to quality management, implantation of total quality management.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching (integrated classroom lectures and exercises).

**Learning activities and teaching methods:**

20 h lectures, 114 h independent study

**Target group:**

Industrial Engineering and Management students and other students studying Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555242A Product development, and 555264P Managing well-being and quality of working life.

**Recommended or required reading:**

Oakland, J.S. (2014) Total quality management and operational excellence (4th ed.). Routledge, 529 pp. and material handed out during the course.

**Assessment methods and criteria:**

To pass the course, the student must pass the weekly course exercises (50 % of the course grade) and an exam (50 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Osmo Kauppila.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555281A Basic Course of Quality Management.

**724811P: Entrepreneurship for Sustainability, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 2

**Learning outcomes:**

After the course the students should:

Understand the roles of entrepreneurship in creating socially responsible change in society, know how to map and analyze alternative sustainable entrepreneurial business ideas based on individual strengths, values and the UN SDGs, know creative problem solving assessment methods, know how to communicate about entrepreneurial ideas.

**Contents:**

## Course description

The course outlines interdisciplinary skills and knowledge that foster the creation of a sustainable entrepreneurial mindset. These skills include problem solving, creativity, networking, communications, risk-taking and adaptability. Entrepreneurship is approached through its different forms and roles in various contexts of society, ecosystems, and businesses. The focus is on entrepreneurial mindsets, responsible business and what entrepreneurship requires from individuals and teams, especially from the "me/us as entrepreneur" standpoint. During the course students familiarize themselves with the role of business and entrepreneurship in building sustainable societies. In addition, students have the opportunity to present their sustainable business ideas to responsible business experts.

## Course objectives

Students develop skills for creative problem solving; students understand that entrepreneurial behavior can take place within many contexts (new ventures, associations, government agencies, and existing businesses); students identify their alternative roles, opportunities, and viewpoints regarding entrepreneurial choices they can make; students strengthen their skills of responsible business and are able to assess choices for business as promotor of social change based on the UN Sustainable Development Goals; students are able to define and assess alternative contexts for entrepreneurial action and to create and assess alternative business scenarios for their future; students are able to recognize and analyze business opportunities and social/customer problems and challenges; students are able to create and evaluate alternative solutions to the identified opportunities, problems, and challenges of responsible business; students are able to communicate effectively about their entrepreneurial ideas.

**Mode of delivery:**

Lectures, workshops and online learning

**Learning activities and teaching methods:**

Learning takes place mostly in groups by means of intensive lectures and workshops, visitor presentations and discussions, both in class and via online learning platform. The course includes 36 contact hours. Reading the course literature (20 h), Groupwork (80 h) and learning diary report (35 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Further details will be provided by the responsible persons in the first session.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Anne Keränen and Jan Hermes

**Working life cooperation:**

The course incorporates real life case examples and meetings with sustainable entrepreneurship practitioners and experts. Students learn interdisciplinary skills that can be applied in real working life.

**Other information:**

The number of students is limited.

**724812P: Building Change Through Entrepreneurship, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ahmad Arslan

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay724812P Building Change Through Entrepreneurship (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 3

**Learning outcomes:**

After the course completion, the students should:

1. Have the basic knowledge about start-ups and new business creation
2. Have the ability to find and utilize information for new business creation
3. Have the knowledge how to analyze own business-case
4. Have the knowledge how the to plan a new start-up
5. Have the ability to present own business-case

**Contents:**

Lectures will focus on the following themes:

Introduction to Entrepreneurship

Recognizing Opportunities and Generating Ideas

Feasibility Analysis

Industry and Competitor Analysis

Developing an Effective Business Model

Building a New Venture Team

Assessing New Venture's Financial Strength and Viability

Writing a Business Plan

Getting Finance or Funding

Preparing for and Evaluating Challenges of Growth

**Mode of delivery:**

Face-to-face teaching complemented with online resources

**Learning activities and teaching methods:**

The course consists of lectures and workshops (32 h), preparation for lectures and workshops (18 h), and, reading the literature and preparation for assignments (50 h), and writing the assignments (40 h).

**Target group:**

B.Sc. and M.Sc. students from different faculties in the university as well as exchange students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

None

**Recommended or required reading:**

- Bruce R. Barringer and R. Duane Ireland (2006). Entrepreneurship: Successfully Launching New Ventures. Pearson Education.

- Slides and relevant online resources

**Assessment methods and criteria:**

Individually written assignments. Completion of 10 assignments correspond to revving grade 5, while minimum two are needed to get 1 in order to pass the course

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Ahmad Arslan and Anne Keränen

**Working life cooperation:**

Practical insights to new business creation tested through several assignments addressing different aspects associated with it.

**Other information:**

The student number is limited to 50.

**724813P: Entrepreneurship in Action, 5 op**

**Voimassaolo:** 01.08.2017 - 31.12.2020

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Niina Karvinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Periods 1-4

**Learning outcomes:**

Upon completion of the course, the students can apply the core competencies of his/her studies in a real-life entrepreneurship context. Students can realize and start working with a business opportunity or social problem in practice to find a solution. The student will improve his/her entrepreneurial skills; multicultural group working, problem solving, communicating and presenting.

**Contents:**

In these studies students generally co-operate in workshops where they learn practical methods of entrepreneurship like business model creation and validation processes, lean methodology, marketing, branding, basic financial management and presenting ideas e.g. pitching.

**Mode of delivery:**

Face-to-face teaching and coaching.

**Learning activities and teaching methods:**

Bootcamps, workshops, group work, individual guidance. Most of the exercises are completed as group work (132 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Programme specific assessment that may include both group and individual assessment methods.

**Grading:**

The course utilizes grading scale "pass/fail"

**Person responsible:**

Niina Karvinen ja Anne Keränen

**Working life cooperation:**

The programs of this course are run in close co-operation with relevant business partners or applied to practice. Students also learn practical entrepreneurship skills.

**Other information:**

The number of students is limited

**724814P: Introduction to Business Development, 5 op**

**Voimassaolo:** 01.08.2017 - 31.07.2021

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Antti Muhos

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 1

**Learning outcomes:**

Students are familiar with basic business concepts and theories in SME context. On successful completion of the course, students understand the business development process from opportunity recognition to a launch and development of a sustainable business. The students are able to identify basic business processes in practice.

**Contents:**

The course focuses on the basic concepts of SME business management and development including opportunity recognition, experimentation and testing of a new business idea, strategy, business model development and business planning, financing and planning and management of growth and change.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Face-to-face teaching including lectures, guest lectures, company visit/s and variable action-based learning methods (36h). Individual assignment (20h) and reading of course materials (76 h).

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Selected readings from e.g.: Spinelli & Adams. 2012, 2016. New Venture Creation: Entrepreneurship for the 21st Century. McGraw-Hill, New York. Allen, K. 2012. New venture creation. South-Western. Moreover, additional materials are provided during the course.

**Assessment methods and criteria:**

Learning diary, group assignment/s

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Matti Muhos

**Working life cooperation:**

This course is designed as an integral part of entrepreneurship studies. This course will include real life case studies of established and emerging businesses by company visits.

**Other information:**

The number of students is limited

**724815P: Entrepreneurial Assignment, 5 op**

**Voimassaolo:** 01.06.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Sari Perätalo

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

The schedule for the course is dependent on the entrepreneurial event or training in which student takes part in.

**Learning outcomes:**

Upon completion of the course the students are familiarized with entrepreneurial activity in society and possess skills that help to solve entrepreneurial problems and make change. Students will have an insight into the diversity of entrepreneurship and gain understanding of the specific aspects of entrepreneurship.

**Contents:**

Studies are tailored upon acceptance by the course instructor. The course consists of two parts: practice, and theory. Students compile the course through participating in different entrepreneurship supporting activities. The students can for example participate in Tellus boot camps, events or volunteering program. In addition, students can include activities organized by other stakeholders (e.g. faculties, public organizations or third sector organizations). In addition, the students reflect their learning in a report.

**Mode of delivery:**

Face-to-face teaching including entrepreneurial project, event, workshop, etc. Individual written assignment and reading the agreed materials.

**Learning activities and teaching methods:**

Individual and group work (132h). Teaching methods vary depending on the entrepreneurial project, event, workshop, etc. a student has participated in.

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course does not require additional studies carried out at the same time.

**Recommended or required reading:**



Materials will be provided during the course.

**Assessment methods and criteria:**

Assessment is based on an individual report that a student is expected to deliver after participating in an entrepreneurship-related event, workshop, project, etc.

**Grading:**

The course utilizes verbal grading scale "pass/fail".

**Person responsible:**

Sari Perätalo

**Working life cooperation:**

The course allows the students to gain first-hand entrepreneurial experience in various forms.

**Other information:**

Contact the responsible teacher to enroll in the course.

**724816P: Building Business Through Creativity and Collaboration, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 4

**Learning outcomes:**

During the course the student will explore entrepreneurship from the perspective of an artistic process and learn the process of designing improbable solutions. The students are challenged to question mainstream values, assumptions taken for granted, and ways of doing things. The course gives the student tools that are needed in developing improbable business models and solutions that can shift paradigms.

During the intensive workshops of the course, the student will work in teams and learn to regulate emotions, such as uncertainty, frustration, enthusiasm, and joy.

Upon completion of the course, the student will:

- develop entrepreneurial leadership
- increase abilities to build new inspiring visions
- master agile methods of creation to deal with uncertainty and risks
- learn how to use diversity and improbable encounters to develop business
- connect passion and convictions with a project which creates value
- leverage failure to increase creativity and resilience

**Contents:**

Entrepreneurs develop activities that aim to challenge the status quo, break rules and subvert systems. Furthermore conflicts, emotional strains and uncertainties are often part of entrepreneurship. But how can such things be taught/learned?

The course introduces Art Thinking, an agile method to create improbable outcomes with certainty. The method enables out-of-the-box thinking and creative productions where encounters of all sorts are key resources. Instead of writing business plans, the participants create during the Improbable workshops artistic prototypes and organize an art exhibition.

During the Improbable workshops students will be taught the Art-Thinking Method which involves 6 main activities. The students will:

- (1) engage in gift-giving practices which foster new and unusual partnerships (Donate);
- (2) "steal" from others to create unique propositions (Deviation);
- (3) follow a journey without a clear goal but which will eventually make a lot of sense (Drift);
- (4) challenge existing rules and values as well as their taken-for-granted assumptions (Destruction);
- (5) accept criticism to learn from others (Dialogue), and
- (6) exhibit their work to get feedback and find new partners (Display).

**Mode of delivery:**

Face-to-face sessions and workshops

**Learning activities and teaching methods:**

Participation in the workshops. Producing a piece of art and presenting it at an art exhibition together with others. Completion of the group work and individual tasks, such as reading course materials and reflecting the learning experiences.

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course

**Assessment methods and criteria:**

Compulsory participation and commitment to the teamwork. Assessment of the course tasks.

**Grading:**

The course utilizes verbal grading scale "pass/fail"

**Person responsible:**

Mia Kemppaala, Anne Keränen

**Working life cooperation:**

Students learn practical entrepreneurial skills through artistic process.

**Other information:**

The number of students is limited

## **H325431: Studies in biochemistry in other universities / abroad - BSc, 0 - 75 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

## **746102P: Basic studies in biochemistry in other universities, 0 - 75 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

**746103P: Basic studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746300A: Intermediate studies in biochemistry in other universities, 0 - 75 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746609M: Studies in other universities/institutes, 0 - 50 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Other Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

## 902100Y: English for Biochemists 1, 3 op

**Voimassaolo:** 01.08.2005 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course

**Vastuuyksikkö:** Languages and Communication

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay902100Y English for Biochemists 1 (OPEN UNI) 3.0 op

### Proficiency level:

CEFR B2 - C1 for Reading, Speaking and Listening

### Status:

Compulsory for all 1st year biochemistry students unless you have received the grade "L" or "E" in the Finnish matriculation exam, in which case you can be exempted from some part of the course. More information on attendance requirements will be provided in the first lesson.

### Required proficiency level:

English must have been the A1 or A2 language at school or equivalent English skills acquired otherwise.

### ECTS Credits:

The student workload is 80 hrs work/ 3 ECTS credits.

### Language of instruction:

English

### Timing:

The first part of English for Biochemists 1 (EfB 1a): 1st year autumn (periods 1 and 2); and the second part of English for Biochemists 1 (EfB 1b): spring term (period 3)

### Learning outcomes:

By the end of the course students will have demonstrated an ability to:

- communicate effectively and precisely about professional matters,
- take effective notes from textbooks and lectures and summarise field-related texts,
- present field-related subjects and use appropriate field-related vocabulary,
- defend a position in a debate.

### Contents:

The aim of this course is to develop reading and listening comprehension skills and oral/aural fluency of participants, and their familiarity with discipline-specific vocabulary. Core skills practiced on this course are the following:

**EfB 1a:** reading in order to understand biochemistry texts, textbooks and research articles; applying different reading strategies to extract global or detailed information according to the reading purpose; understanding word formation in order to expand vocabulary, both general scientific and field-specific; understanding basic grammatical structures of scientific English as well as text structure and cohesion markers for improved comprehension.

**EfB 1b:** practicing oral/aural skills relevant to studying at university level, taking part in the scientific community using professional vocabulary and demonstrating field-related knowledge (discussions, debating, etc.)

### Mode of delivery:

Contact teaching, small-group tutorials and online self-study elements

### Learning activities and teaching methods:

EfB 1a: contact teaching 20 hours and independent work 32 hours; EfB 1b: contact teaching for whole class 6-8 hours, small group tutorials 2x1 hour (minimum) and independent work 18 hours.

### Target group:

1st year Biochemistry students

### Prerequisites and co-requisites:

-

### Recommended optional programme components:

Part of the course is integrated with the [740143P Biomolecules for Biochemists](#) course.

### Recommended or required reading:

Course materials will be provided by the teacher in electronic form.

### Assessment methods and criteria:

The course utilises continuous assessment that is based on the learning outcomes of the course. In addition, full and active participation in all course activities is required, students must pass the end-of-term test, and defend their position effectively in the debate in the *Biomolecules for Biochemists* course.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Pass/fail

**Person responsible:**

Kari-Pekka Kallunki

**Working life cooperation:**

-

**Other information:**

Exemption from part of the course **is given to students** with a matriculation exam grade *laudatur* or *eximia cum laude approbatur* and those who have graduated from an IB-programme. However, **attendance is compulsory for ALL students at the first lesson**, where more information will be provided to those who are due exemption.

## 740076Y: Orientation, 2 op

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jari Heikkinen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

2 credits

**Language of instruction:**

Finnish

**Timing:**

BSc yr1 autumn-yr1 spring

**Learning outcomes:**

Upon completion of the course the students should be able to:

- go in Linnanmaa and Kontinkangas campus and find various supporting services
- use university terminology
- plan his studies and create a personal study plan (PSP) according to BSc degree structure
- use Weboodi to support his studies
- describe research work done in the faculty and biochemist's work

**Contents:**

Course familiarizes students with university studies and environment and illustrate goals and content of biochemistry degree programme. Under the guidance of faculty personel (Chaperones) students see the spectrum of scientific research done in the Faculty and biochemists doing a research work. In a seminar "biochemist in working life" biochemists graduated from the Faculty give a talk on their experiences in working life.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

10-15 h group work (small group tutoring), 16 h presentation of research work done in the Faculty, 2 h seminar

**Target group:**

yr1 BSc students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Active attendance

**Grading:**

Pass/fail

**Person responsible:**

Jari Heikkinen and small group tutors and chaperones

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa and Kontinkangas

**901051Y: Second Official Language (Swedish), Oral Skills, 2 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Language and Communication Studies**Laji:** Course**Vastuuyksikkö:** Languages and Communication**Opintokohteen kielet:** Swedish**Proficiency level:**

This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginners' courses in Swedish at the university.

**901050Y: Second Official Language (Swedish), Written Skills, 1 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Language and Communication Studies**Laji:** Course**Vastuuyksikkö:** Languages and Communication**Opintokohteen kielet:** Swedish**Proficiency level:**

This course is only for Finnish speaking students with CEFR-level A2-B1 in Swedish language. There are no beginners' courses in Swedish at the university.

**740151P: Biochemical methodologies I, 10 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Kaija Autio**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay740153P Basic biochemistry 2: Methods (OPEN UNI) 2.0 op

ay740144P Biochemical Methodologies I (OPEN UNI) 8.0 op

740144P Biochemical Methodologies I 8.0 op

**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

10 credits

**Language of instruction:**

Lectures: Finnish, laboratory practicals: English

**Timing:**

B.Sc. yr1 autumn (lectures), yr1 spring (laboratory practicals)

**Learning outcomes:**

Upon successful completion students are able to:

- use basic methods used in biochemical research laboratory
- Use laboratory equipment and work safely
- Prepare solutions used in the lab

- document and present experiments and results in the laboratory and other works

**Contents:**

This module covers the basic methodologies used in practical biochemistry. The following topics will be addressed: safety in the laboratory, qualitative and quantitative observations, the calculations of concentrations and dilution factors (includes a workshop), pipette cleaning and calibration, identification and quantification of biological molecules, principals and practice of the use of centrifuges, spectrophotometry, SDS-PAGE, agarose gel electrophoresis, thin-layer and paper chromatography, basics of protein purification, extraction of chromosomal DNA from bacteria, mini-prep extraction of plasmid DNA, extraction of RNA from mammalian tissue, sterile technique, basic microbial growth, dialysis, filtration and pH measurement. In addition transferable skills like word processing (Microsoft Word) and spreadsheet (Microsoft Excel), drawing of curve charts, the basics of oral presentation, ethics in scientific research and good scientific practice are involved.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

34 h lectures and exercises, 120 h lab. Laboratory work is compulsory. It is possible to complete lecture part only (3.5 ECTS).

**Target group:**

Major students

**Prerequisites and co-requisites:**

Biomolecules, Biomolecules for Biochemists tai Biomolecules for Bioscientists

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended reading: Reed, Holmes, Weyers & Jones: Practical skills in biomolecular sciences, 4th edition, Pearson, 2013.

You can check the availability of the course books via [this link](#)

**Assessment methods and criteria:**

Continuous assessment (home works, lab reports), final exam

**Grading:**

1-5/fail

**Person responsible:**

Kaija Autio

**Working life cooperation:**

No

**Other information:**

Location of instruction: lectures (in Finnish) at Linnanmaa campus, laboratory practicals at Kontinkangas campus

**740143P: Biomolecules for Biochemists, 8 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay740157P	Basic biochemistry 1: Biomolecules (OPEN UNI)	4.0 op
ay740152P	Basic biochemistry 1: Biomolecules (OPEN UNI)	5.0 op
740147P	Biomolecules for Bioscientists	8.0 op
740148P	Biomolecules	5.0 op

**ECTS Credits:**

8 credits

**Language of instruction:**

English and Finnish

**Timing:**

B.Sc yr1 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell the composition, structure and function of the major groups of biomolecules in cells; nucleic acids, proteins, carbohydrates and lipids and describe the forces that modulate their function.
- apply information in the right context and evaluate it critically
- In addition, students on the 8op versions are able to work in the biochemical laboratory, are able to solve calculations and problems and are able to interpret the scientific data they generate.

**Contents:**

This module provides an overview of biochemistry, outlining the forces involved in biomolecule structure and the chemical structures and properties of polynucleic acids, proteins, carbohydrates and lipids. There will also be an introduction to prebiotic evolution and writing of a synopsis on this subject. The module is arranged into lectures or workshops, computing and other exercises and laboratory work. All of the course materials are in English, but both English and Finnish are used in teaching. Both a final examination and continuous assessment will count towards the final mark and attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

30 h lectures, 32 h lab., plus exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Appling et al. Biochemistry – Concepts and Connections (2nd edition, 2019)

Pearson Education Limited; ISBN 10: 1-292-26720-8, or equivalent

**Assessment methods and criteria:**

Continuous assessment, final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: lectures and computing at Linnanmaa campus, wet labs at Kontinkangas campus

**740146P: Metabolism I, 6 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay740158P Basic biochemistry 3: Metabolis (OPEN UNI) 4.0 op

ay740154P Basic biochemistry 3: Metabolis (OPEN UNI) 3.0 op

740149P Metabolism I 4.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Lectures: Finnish, laboratory practicals: English

**Timing:**

B.Sc. yr1 spring

**Learning outcomes:**

Students will be able to explain the main principles of how the metabolism is made up, will get a detailed picture of the energy metabolism, and will be able to organize part of the wholeness of metabolism, particularly how energy metabolism is networked to the synthesis and degradation of biomolecules.



**Contents:**

On this course the central concepts and mechanisms of metabolism, its regulation and the integration of metabolic pathways will be introduced, like anabolism and catabolism, linking of different pathways, and metabolic regulation. Especially the energy metabolism will be studied, concerning carbohydrates, lipids and the respiratory chain. Combined with the course Metabolism II the students will get a good overview on the principles of metabolism, metabolic integration and the methods to study metabolism.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (28 h), problem-based exercises (workshops) 6 h, laboratory work (32 h, attendance obligatory), lab diary and final exam.

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Biomolecules, Biomolecules for Biochemists or Biomolecules for Bioscientists

**Recommended optional programme components:**

Biomolecules, Biomolecules for Biochemists tai Biomolecules for Bioscientists

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Problem-based exercises, laboratory work and a final exam will count towards the final grade.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail. Problem-based exercises, laboratory work and a final exam will count towards the final grade.

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**740145P: Physical Biochemistry, 6 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** André Juffer

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- define the relevance of theoretical concepts to the biosciences
- tell where various equations of physical biochemistry come from
- discuss the link between theory and experiment
- perform simple but realistic calculations

**Contents:**

This module will cover the concepts of thermodynamics and their application to biochemical systems plus chemical and enzymatic kinetics. Topics covered will include:

*Concepts of thermodynamics:* First, Second and Third Law of Thermodynamics. Heat. Work. Enthalpy. Entropy, Gibbs and Helmholtz free energy, Chemical potential, Chemical potential of a solute, Free energy and equilibrium.

*Applications of thermodynamics:* Chemical reactions, Protein-ligand association, Acids, bases and pH regulation, Acid-dissociation constants, introduction to thermodynamics of protein folding.

*Chemical kinetics*: Basic chemical reactions and single step reactions, Applications of chemical kinetics to multistep reactions, Catalysis and enzyme kinetics.

Attendance of some parts of the course is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lecture and exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended books:

Price NC *et al.*, *Principles and problems in Physical chemistry for Biochemists*, Third edition, Oxford University Press, Oxford, 2001.

Atkins P and De Paula J, *Physical chemistry*, 8ed, Oxford University Press, Oxford, 2006.

Atkins P and de Paula J. *Physical chemistry for the life science*, Oxford University Press, Oxford, 2006.

**Assessment methods and criteria:**

Homeworks, workshops, no exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

André Juffer

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

## 740376A: Bachelor's Thesis, 10 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

10 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr3 autumn

**Learning outcomes:**

Students should be able to execute a project to produce a thesis type of output, be well aware of current research trends in biochemistry, be able to critically select knowledge from the literature, be able to discuss and debate scientific results, and be able to choose and evaluate proper form of presentation for each purpose.

**Contents:**

The theme of the module is public understanding of science and the reporting of biochemical research using different methods and for different audiences. During the course students will learn on a general level about different fields of biochemistry and their specific questions, orientation of biochemical research and organization of research into projects. Practical exercises will contain presenting of a given subject in different forms, which may be a talk, a short article, a poster, a press release or a research proposal. A literature report will be written as well as a popularized presentation of it. In addition the course is linked to the module Ruotsin kieli (Swedish language).

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 hr lectures and practicals, web-based learning and self study

**Target group:**

Major students

**Prerequisites and co-requisites:**

Course is for BSc yr3 students

**Recommended optional programme components:**

Information skills 030005P can be taken as a part of Bachelor's thesis course

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Writing and presentation of BSc thesis.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**740362A: Cellular Biology, 6 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Henrika Honkanen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740323A Cell culture course 3.0 op

744610S Advanced course for cell biology 3.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Lectures: Finnish and English Laboratory Practicals: English

**Timing:**

B.Sc. yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- interpret and analyze the general molecular mechanisms of cell functions
- plan how such molecular mechanisms can be studied in vitro and in vivo
- track the molecular defects that might be responsible for abnormal functioning of cells e.g. in disease states

**Contents:**

The aim of the course is to deepen the knowledge about where in the cell different biochemical reactions take place, how the molecules are trafficked between organelles, and how these phenomena can be studied in cultured cells.

The course aims to address specifically the specific functions of the organelles in an eukaryotic cell, transport of material into and out of the cells, and how the cytoskeleton serves many of these functions. The course contains practical lab work, during which the students learn basic skills on cell culture and fluorescence microscopy. The practical course is compulsory for the Biochemistry students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures, 40 h lab

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cell biology, Biomolecules for biochemists, Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lodish, et al., Molecular Cell Biology (partly), 4th edition. W.H. Freeman and Company

**Assessment methods and criteria:**

Lab reports, final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Henrika Honkanen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**740366A: Cellular Communication, 6 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- name, list and discuss the major intra- and intercellular signalling pathways
- present, describe and discuss characteristic features of signalling pathways
- describe how to study, examine and analyse signalling pathways

**Contents:**

The course covers basic aspects of the main cellular signalling pathways. The main emphasis will be made on the signalling pathways involved in the action of various hormones, growth factors, lipid-derived signaling molecules, and their cell surface and intracellular receptors, intracellular second messengers and protein kinases and phosphatases. The course involves a 40 h practical course (+written reports) in which cultured cells are used as targets to visualize certain hormone or drug-induced signaling molecules, their interactions, and how these regulate e.g. normal cell growth and/or cell death in culture. Attendance at practical course is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 32 h practicals

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Laboratory practicals, final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**740372A: Final Examination, 6 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** English

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 autumn-spring

**Learning outcomes:**

Upon successful completion students are able to:

- present the full breadth of the core topics of biochemistry
- Integrate material from multiple sources

**Contents:**

This examination will test the ability of students to integrate knowledge from the core biochemistry modules they have taken during their BSc. It will include questions covering the material from Biomolecules for Biochemists, Biochemical methodologies I, Physical biochemistry, Metabolism I, Molecular biology I, Cellular biology, Microbiology, Protein Chemistry I, Cellular communication and Metabolism II. The questions will require an understanding of the basic principles of biochemistry and each will be based on subject specific material from at least two modules.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Student self-study

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Renata Prunskaitė-Hyyryläinen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**740377A: Maturity test (B.Sc. degree), 0 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

0 credits

**Timing:**

BSc yr3 spring

**Learning outcomes:**

After BSc maturity test student is able to write a logical and analytical summary of his BSc thesis.

**Contents:**

Maturity test (B.Sc.) will be written in the topic of B.Sc. thesis. In the test student proves to command both the subject of B.Sc thesis and native language.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students

**Assessment methods and criteria:**

An essay written under invigilation (500 words, will be written electronic in Exam-system in the Examinarium).

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

-

## 740367A: Metabolism II, 6 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lauri Eklund

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740375A Metabolism II 4.0 op

**ECTS Credits:**

6 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

Students should be able to outline in detail how cells use various small and large molecules, how cells synthesize and degrade metabolites for their needs, and how metabolic network is connected and integrated.

**Contents:**

Metabolism II completes the discussion of energy metabolism by combining it with metabolism of nitrogen-containing compounds and synthesis and degradation of different biomolecules, as well as extends the analysis of the central concepts and mechanisms of metabolism. It will be seen how the metabolic pathways that were examined separately will be connected to each other and regulated. Some chemical mechanisms of pathways as well as ways to supply precursors for the main stream pathways will be handled. Special aspects of metabolism, like tissue specificity and physiological states, will also be studied. Photosynthesis is studied as continuation to energy metabolism.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures 29h, workshops 27h, 4 workshop reports, final exam. Attendance at workshops is obligatory.

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Metabolism I

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (homeworks, workshops), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Lauri Eklund

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa

## 740363A: Microbiology, 6 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Pospiech, Helmut

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740374A	Microbiology	3.0 op	
740322A	Microbiology	3.0 op	
740324A	Laboratory course in microbiology	3.0 op	

**ECTS Credits:**

6 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- define the typical features of bacteria, archaea, fungi and virus and explain the diversity of different groups of microorganisms
- explain the basic aspects of microbial metabolism
- understand the basics of microbial growth, enrichment, culture and growth control both in the environment and in contained culture
- explain the essential roles of microorganisms in our environment
- apply their knowledge for the growth and its control of standard laboratory microorganisms
- have a basic understanding of the industrial use of microorganisms or microbial compounds.

**Contents:**

This module is an introduction to general and applied microbiology and consists of lecture and laboratory exercises. In the lectures, the diversity and classification of microorganisms, especially bacteria will be introduced. Further topics are the structure and function of the prokaryotic cell, bacterial growth, metabolism and physiology, the importance of bacteria in different ecosystems as well as the industrial use of bacteria. The exercises introduce basic microbiological methods and techniques for the aseptic work. These include culture on solid and in liquid media, transfer of bacteria by streaking or spreading, the use of dilution and enrichment techniques, the inhibition of bacterial growth, measurement of bacterial growth and death, and finally the basics of transformation and bacteriophage infection and its use in molecular biology. Attendance at practical course is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 hours lecture and 60 hours laboratory exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

Biomolecules for Biochemists and Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

M. Salkinoja-Salonen (ed.) (2002) Mikrobiologian perusteita, Helsingin yliopisto; Michael T. Madigan, John M. Martinko, Paul V. Dunlap, and David P. Clark Parker (2010) Brock biology of microorganisms, 12th ed. Prentice Hall International. Microbiology laboratory exercises, Dept. Biochemistry (2010).

**Assessment methods and criteria:**

Continuous assessment (home works, lab reports), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Helmut Pospiech

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**740361A: Molecular Biology I, 8 op**

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Mirva Saaranen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

740373A	Molecular Biology I	4.0 op
740318A	Molecular Biology	4.0 op
740337A	Laboratory Course in Molecular Biology	3.0 op

**ECTS Credits:**

8 credits

**Language of instruction:**

Lectures: Finnish, laboratory practicals: English

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

After this course students should understand the basics of molecular biology and be able to use modern molecular biology methods.

**Contents:**

The course covers gene structure, DNA replication, recombination, transcription, translation and basics of gene expression. The student will learn the most common recombinant DNA techniques, such as PCR, use of restriction endonucleases, preparation of recombinant plasmids and DNA sequencing. Attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 4 h computer exercise, 80 h lab, homeworks. Laboratory and computer practicals are compulsory

**Target group:**

Major subject students

**Prerequisites and co-requisites:**

Cellular biology, Biomolecules for Biochemists and Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Mathews, CK, van Holde KT, Applins DR, Anthony-Cahill SJ: Biochemistry (4th edition). Optional.



**Assessment methods and criteria:**

Homeworks 35 %, lab reports 30 % and final exam 35 %.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail.

**Person responsible:**

Mirva Saarinen and Henrika Honkanen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**740386A: Physiological biochemistry, 5 op**

**Voimassaolo:** 01.01.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Kalervo Hiltunen

**Opintokohteen kielet:** English, Finnish

**Leikkaavuudet:**

740371A Physiological Biochemistry 4.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English / Finnish

**Timing:**

B.Sc. yr2-3 spring

**Learning outcomes:**

Aim of the course is to get students familiar with :

- Specific aspects of human biochemistry
- Structure, tasks and function of different organs
- Systemic and intracellular regulation of metabolism
- Functional and regulatory relations of different organs

**Contents:**

Lectures include information about morphology, function and role in metabolism of adipose tissue, kidney, muscle tissue and cytoskeleton, alimentary system and liver. They also focus on structure of biomembranes, composition and function of endocrine system, hormone synthesis and signal transduction. Mechanisms of action of hormones (especially steroid hormones), their cell surface and intracellular receptors, second messengers and other regulatory molecules will be discussed.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 2 h seminars, 10 h laboratory work and home work. Seminars, home work and laboratory work are compulsory.

**Target group:**

Major students

**Prerequisites and co-requisites:**

Basic biochemistry, cellular and molecular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

Murray et al. Harpers' Illustrated Biochemistry (29<sup>th</sup> edition)

**Assessment methods and criteria:**

Home work and final exam

**Grading:**

1-5/fail

**Person responsible:**

Kalervo Hiltunen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

## 740364A: Protein Chemistry I, 8 op

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Rajaram Venkatesan

**Opintokohteen kielet:** English

**ECTS Credits:**

8 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell the relevance of protein structure, including post-translational modification, to protein function
- describe the techniques available to purify proteins and to study protein function and have an appreciation of the applications and limitations of these techniques
- analyze a wide range of biochemical data and solve problems relating to the interpretation of data concerning protein function and basic structural characterization

**Contents:**

This module provides more detailed information on the chemistry of proteins. Topics covered include protein purification, reversible and irreversible covalent modifications of proteins, protein translocation, protein degradation, an introduction to the protein folding problem, protein structure analysis, basic enzyme catalysis mechanisms and co-enzymes. The module includes lectures, continuous assessments, group works, student presentations, and laboratory exercises. Final examination, lecture attendance/ continuous assessments, presentations and laboratory reports will all count towards the final mark. Attendance at laboratory exercises is obligatory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures including student presentations, 80 h lab, exercises

**Target group:**

Major students

**Prerequisites and co-requisites:**

Biomolecules for Biochemists, Biochemical methodologies I

**Recommended optional programme components:**

-

**Recommended or required reading:**

Recommended reading": Greighton: Proteins, Structure and Molecular Properties, W.H. Freeman & Co, 2002 (2nd ed.)

**Assessment methods and criteria:**

Presentation, lab reports, attendance / continuous assessment

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Rajaram Venkatesan

**Working life cooperation:**

No

**Other information:**

Location of instruction: Lectures at Linnanmaa campus, laboratory exercises at Kontinkangas campus.

**780117P: General and Inorganic Chemistry A, 5 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Chemistry**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

780120P	Basic Principles in Chemistry	5.0 op
ay780117P	General and Inorganic Chemistry A (OPEN UNI)	5.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780113P	Introduction to Chemistry	12.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op
780109P	Basic Principles in Chemistry	4.0 op

**ECTS Credits:**

5 credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain organic and inorganic chemistry fundamentals, basic concepts and terminology.
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

Basic concepts of chemistry, chemical formula, chemical reaction, chemical equation, oxidation-reduction reactions, stoichiometry, gases, chemical equilibrium, acids and bases, additional aspects of acid-base equilibria, solubility and complex-ion equilibria.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

30 hours of lectures and applications, 20 hours of exercises and 85 hours of self-study.

**Target group:**

Biochemistry, Chemistry compulsory. In the entity of 25 credits (minor studies), compulsory.

Physical sciences, Mathematical sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 1-6, 14.2, 15-18.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Johanna Havia

**Working life cooperation:**

No

**Other information:**

No

**780118P: General and Inorganic Chemistry B, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay780118P	General and Inorganic Chemistry B (OPEN UNI)	5.0 op
780114P	General and Inorganic Chemistry I	6.0 op
780115P	General and Inorganic Chemistry II	6.0 op
780113P	Introduction to Chemistry	12.0 op
780101P	Introduction to Physical Chemistry	7.0 op
780102P	Introduction to Inorganic Chemistry	5.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn

**Learning outcomes:**

After this course, the student:

- can explain inorganic chemistry fundamentals, basic concepts and terminology
- understand basic concepts of chemistry as described in international general chemistry curriculum.

**Contents:**

Thermodynamics, reaction kinetics, electrochemistry, electrons in atoms, periodic table, chemical bond, intermolecular forces.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

32 hours of lectures and applications, 18 hours of exercises, 85 hours of self-study.

**Target group:**

Biochemistry, Chemistry, compulsory. In the entity of 25 credits (minor studies), compulsory.

Physical sciences, Mathematical sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Petrucci, R.H., Herring, F.G., Madura, J.D. ja Bissonnette, C.: General Chemistry: Principles and Modern Applications, 11. edition (also 7., 8., 9. ja 10. edition), Pearson Canada Inc., Toronto, 2017. Chapters 7-11.1- 11.7, 12.1, 13, 19-20.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Matti Niemelä

**Working life cooperation:**

No

**Other information:**

No

## 780116P: Introduction to Organic Chemistry, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay780116P	Introduction to Organic Chemistry (OPEN UNI)	5.0 op
780103P2	Organic Chemistry I	6.0 op
780108P	Basic Course in Organic Chemistry	6.0 op
780112P	Introduction to Organic Chemistry	4.0 op
780103P	Introduction to Organic Chemistry	6.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish. Book-examination in English as well.

**Timing:**

1st spring

**Learning outcomes:**

After this course, the student:

- can recognize and name basic organic compounds and explain their properties.
- can explain organic chemistry basic concepts.
- can deduce basic reaction types and solve their mechanisms.

**Contents:**

Classification of organic compounds and their properties. Basic reactions of organic compounds: addition, elimination and substitution along with the reaction mechanisms. Basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

38 hours of lectures plus 12 hours of exercises, 84 hours of independent self-study.

**Target group:**

Biochemistry, Chemistry, Biology, Process Engineering, Environmental Engineering and in the study entity of 25 credits, compulsory.

Physical Sciences, Geology, Geography, Mathematical Sciences, optional.

**Prerequisites and co-requisites:**

Upper secondary school chemistry

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Hart, H.: Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999; Hart, H. ja Hart, D.: Study Guide & Solutions Book, Organic Chemistry: A Short Course, 10. ed. or newer, Houghton Mifflin, Boston, 1999 and material in Moodle.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Johanna Kärkkäinen

**Working life cooperation:**

No

## 780123P: Introductory Laboratory Works in Chemistry, 5 op

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780127P Principles of Chemistry Labwork 5.0 op

**ECTS Credits:**

5 ECTS credits / 135 hours of work

**Language of instruction:**

Finnish

**Timing:**

1st autumn or 1st spring

**Learning outcomes:**

After this course, the student can apply laboratory safety instructions and act accordingly. He/she can communicate by using basic laboratory terminology, identifies basic laboratory equipment and can use them properly. He/she recognizes the importance of the planning of the laboratory work. The student is able to utilize the basic chemistry techniques and determination methods in the given task. Furthermore, the student can also make laboratory notes and write a report on the performed task.

**Contents:**

Laboratory safety, basic laboratory equipment, basic chemistry techniques and determination methods as well as some of their theoretical background, problems related to the studied determination methods, keeping a laboratory notebook, writing a report.

**Mode of delivery:**

Supervised laboratory work, independently done preparatory problems and reports.

**Learning activities and teaching methods:**

Safety in laboratory 2 hours, 40 hours of laboratory works, 93 hours of self-study.

**Target group:**

Biochemistry, Process Engineering, Environmental engineering, compulsory. In the entity of 25 credits: compulsory. Physical Sciences, Geology, Mathematical Sciences, Biology: optional.

**Prerequisites and co-requisites:**

Basic Principles in Chemistry (780120P, 5 cr) or General and Inorganic Chemistry A (780117P, 5 cr). Student is allowed to participate to the course simultaneously when participating the prerequisites. Attendance at the lecture of Safety in laboratory is compulsory.

**Recommended optional programme components:**

Participation in the courses General and Inorganic Chemistry A (780117P, 5 cr) and Introduction to Organic Chemistry (780116P, 5 cr).

**Recommended or required reading:**

Instruction Book (in Finnish)

**Assessment methods and criteria:**

Accomplishment of the course requires accepted preparatory problems, laboratory exercises and problems related to them.

**Grading:**

The course utilizes verbal grading scale pass/fail.

**Person responsible:**

Teija Kangas

**Working life cooperation:**

No

**Other information:**

Attendance at the lecture of Safety at work is compulsory.

## **757122P: Concepts of genetics for biochemists, 3 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Heikki Helanterä

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

757109P Concepts of genetics 5.0 op

**ECTS Credits:**

3 ECTS cr / 81 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

According to biochemistry students schedule.

**Learning outcomes:**

To understand and apply basic concepts of genetics, at Mendelian and molecular level.

**Contents:**

Part 1. Mendelian genetics, including the basic of quantitative and population genetics and Part 3. Selected topics on developmental genetics, and genetics of health and diseases.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

24 h lectures and seminars, 57 h independent studies, exam.

**Target group:**

Biochemistry students: parts 1 and 3 (3 cr) compulsory.

**Prerequisites and co-requisites:**

Introduction to cell biology and physiology (750122P) or equivalent knowledge.

**Recommended optional programme components:**

This course is prerequisite to all other genetics courses.

**Recommended or required reading:**

Materials are in Optima. Klug et al. 2012. Concepts of Genetics (10. ed or later). Pearson, 896 p. Alberts, B. et al. 2008: Molecular Biology of the Cell (5. ed). Garland Science Publishing, London, 1268 p.

The availability of the literature can be checked from [this link](#).

**Assessment methods and criteria:**

Exam, home work assignments.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail.

**Person responsible:**

Assoc. Prof. Heikki Helanterä.

**Working life cooperation:**

No.

**Other information:**

-

**750122P: Introduction to cell biology and physiology, 5 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.S. 1st autumn.

**Learning outcomes:**

Students will acquire comprehensive understanding of how an organism's function on molecular, cell and physiological level.

**Contents:**

The course has been divided into four sections: animal- and plant cell biology, genetics, and animal physiology.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

40 hours of lecture and hours of independent learning.

**Target group:**

Compulsory to the biology and biochemistry students.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Molecular Biology of the Cell (Alberts et al.)

Biology: a global approach (Campbell ym.)

**Assessment methods and criteria:**

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail. Final grade is average value of the exams.

**Person responsible:**

Prof. Hely Häggman and Dr. Sanni Kinnunen.

**Working life cooperation:**

No.

**Other information:**

-

*Compulsory*

**750122P-01: Introduction to cell biology and physiology, genetics, 0 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen kielet:** Finnish

**750122P-04: Introduction to cell biology and physiology, animal physiology, 0 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen kielet:** Finnish

**750122P-03: Introduction to cell biology and physiology, plant cell biology, 0 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Basic Studies

**Laji:** Partial credit

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Häggman, Hely Margaretha

**Opintokohteen kielet:** Finnish



**750122P-02: Introduction to cell biology and physiology, animal cell biology, 0 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Basic Studies**Laji:** Partial credit**Vastuuyksikkö:** Field of Biology**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Häggman, Hely Margaretha**Opintokohteen kielet:** Finnish**806119P: A Second Course in Statistics, 5 op****Voimassaolo:** 01.06.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Mathematics**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Jari Päckilä**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

806113P	Introduction to Statistics A	5.0 op
806109P	Basic Methods in Statistics I	9.0 op

**ECTS Credits:**

5 ECTS credits

**Language of instruction:**

Finnish

**Timing:**

4th period

**Learning outcomes:**

Upon completion of the course, student will be able to:

- analyze continuous and categorical response in the most common experimental and observational studies
- critically evaluate scientific articles
- implement and interpret analyses of a statistical software concerning issues of the course.

**Contents:**

- Skills for performing statistical analyses and inferences on the basis of data obtained in common experimental and observational studies are expanded and deepened
- statistical literacy of scientific articles with quantitative methods

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

**Target group:**

Minor students

**Prerequisites and co-requisites:**

The recommended prerequisite prior to enrolling for the course is the completion of the course: 806118P Introduction to Statistics or 806116P Statistics for Economic Sciences.

**Recommended optional programme components:**

After the course, student is able to continue other statistics courses.

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Mid-term exams and/or final exam and possible homework.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Jari Päckilä

**Working life cooperation:**

No

**806118P: Introduction to Statistics, 5 op****Voimassaolo:** 01.06.2015 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Mathematics**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Jari Pääkkilä**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay806118P Introduction to Statistics (OPEN UNI) 5.0 op

806113P Introduction to Statistics A 5.0 op

**ECTS Credits:**

5 ECTS credits

**Language of instruction:**

Finnish

**Timing:**

3rd period

**Learning outcomes:**

After completing the course, student will be able to:

- consider issues influencing to data collection
- describe data by appropriate methods (tables, statistics and graphical presentations)
- evaluate the effect size of the sample to the margin of error for instance in Gallup polls and in different market researches
- interpret output of a statistical software.

**Contents:**

- collecting data, e.g. sampling
- variables and measuring
- descriptive statistical methods and their selection
- margin of error of estimator for population mean and proportion
- statistical literacy
- basic analysis of data using statistical software

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Total 50 h face-to-face teaching including lectures and exercise (partly computer exercises). Independent work 83 h.

**Target group:**

Minor students

**Recommended optional programme components:**

After the course, student is able to continue to A Second Course in Statistics.

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Mid-term exams and/or final exam and possible homework.

**Grading:**

Fail, 1-5

**Person responsible:**

Hanna Heikkinen and Jari Pääkkilä

**Working life cooperation:**

No

**H325420: Recommended optional studies - BSc, 4 - 51 op****Voimassaolo:** 01.08.2012 -**Opiskelumuoto:** Intermediate Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

### *Electives*

#### **781305A: Organic Chemistry I, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780389A	Organic Chemistry I	6.0 op
780385A	Organic Chemistry I	9.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

2nd autumn

**Learning outcomes:**

After passing the course the student can explain the basics in molecular orbitals in simple organic compounds such as ethane, details in nucleophilic substitution, conformation and the basics in stereochemistry of organic compounds.

**Contents:**

Including molecular orbitals in organic compounds, conformation theory, nucleophilic substitution and basics of stereochemistry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

40 hours of lectures, 94 hours self study

**Target group:**

Chemistry, compulsory. In the entity of 60 credits, compulsory.

**Prerequisites and co-requisites:**

Introduction to Organic Chemistry (780103P or 780116P) and the courses General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P); or the courses General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P); OR Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P).

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Clayden, J., Greeves, N., Warren, S., Wothers, P.: Organic Chemistry, Oxford University Press, 2001 and Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2nd Edition, 2012.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Juha Heiskanen

**Working life cooperation:**

No

**780119P: Introduction to Analytical Chemistry, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780111P	Introduction to Analytical Chemistry	4.0 op
780110P	Analytical Chemistry I	5.5 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish

**Timing:**

2nd autumn

**Learning outcomes:**

Upon completion the student should have acquired knowledge and understanding of basic concepts of quantitative chemical analysis employing classical methods of analysis.

**Contents:**

Steps in quantitative analysis, statistical evaluation of analytical data, chemical equilibrium in aqueous solutions, gravimetry, titrimetry, spectrophotometry.

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

30 hours of lectures + 20 hours of exercises + 84 hours of self-study

**Target group:**

Chemistry, compulsory. In the study entity of 25 credits compulsory. Mathematical Sciences, Physical Sciences, optional.

**Prerequisites and co-requisites:**

General and Inorganic Chemistry A (780117P) and General and Inorganic Chemistry B (780118P), or General and Inorganic Chemistry I (780114P) and General and Inorganic Chemistry II (780115P), or Introduction to Chemistry (780113P), or Basic Principles in Chemistry (780109P).

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Harvey, D.: Analytical Chemistry 2.0-an open-access digital textbook (can be loaded from Internet).  
Saarinen, H. ja Lajunen, L.H.J.: Analyttisen kemian perusteet, Oulun yliopistopaino, 2004.

**Assessment methods and criteria:**

Two intermediate examinations or one final examination.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Paavo Perämäki

**Working life cooperation:**

No

**030005P: Information Skills, 1 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Technology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ursula Heinikoski

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

030004P Introduction to Information Retrieval 0.0 op

**ECTS Credits:**

1 ECTS credit / 27 hours of work

**Language of instruction:**

Finnish

**Timing:**

Architecture 3. spring semester, period III;  
 biochemistry 3. autumn semester;  
 biology 3. autumn semester, period I;  
 chemistry 3. autumn semester, period I;  
 civil engineering 2. spring semester, period IV;  
 computer science and engineering 2. spring semester, period IV;  
 electronics and communications engineering 3. spring semester;  
 geosciences 2. spring semester, period IV;  
 geography 3. semester, periods I and III;  
 industrial engineering and management 3. year;  
 information processing sciences 1. or 3. year;  
 mathematics and physics 1. spring semester, period III;  
 mechanical engineering 3. year;  
 mining engineering and mineral processing 3. year;  
 process and environmental engineering 2. year, period II;  
 Master's degree students in industrial engineering and management 1st year.

**Learning outcomes:**

Upon completion of the course, the students:

- can search scientific information,
- can use the most important databases of their discipline,
- know how to evaluate search results and information sources,
- can use the reference management tool.

**Contents:**

Scientific information retrieval process, the most important databases and publication channels of the discipline, evaluation of the reliability of information sources and reference management tool.

**Mode of delivery:**

Blended teaching: classroom training, web-based learning material and exercises, a group assignment.

**Learning activities and teaching methods:**

Training sessions 8 h, group working 7 h, self-study 12 h

**Target group:**

Compulsory for all bachelor degree students of Faculty of information technology and electrical engineering, Faculty of Technology and Faculty of science. Compulsory also for those Master's degree students in Industrial Engineering and Management who have no earlier studies in the information skills. Optional for the students of biochemistry.

**Recommended optional programme components:**

In biochemistry the course is completed as a part of 740376A Bachelor's Thesis.

**Recommended or required reading:**

Web learning material [Tieteellisen tiedonhankinnan opas](#)

**Assessment methods and criteria:**

Passing the course requires participation in the training sessions and successful completion of the course assignments.

**Grading:**

pass/fail

**Person responsible:**

Ursula Heinikoski

**781307A: Laboratory Course I in Organic Chemistry, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Chemistry

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

780329A Laboratory Course I in Organic Chemistry 4.0 op

**ECTS Credits:**

5 ECTS credits / 134 hours of work

**Language of instruction:**

Finnish, English on demand, materials in English (partly)

**Timing:**

2nd autumn

**Learning outcomes:**

Upon completion of the five different syntheses of the course, the student is familiar with safety issues, glassware and equipment, use of laboratory notebook and reporting of laboratory experiments. He/she should be able to work by using basic techniques of organic chemistry such as distillation, extraction, crystallization, TLC.

**Contents:**

Different organic syntheses.

**Mode of delivery:**

Face-to-face teaching in the laboratory

**Learning activities and teaching methods:**

8 h lectures (obligatory for all), 50 h laboratory of supervised, independent laboratory work and 73 h self-study and reporting, seminar 3 h.

**Target group:**

Chemistry, compulsory

**Prerequisites and co-requisites:**

General and Inorganic Chemistry A and General and Inorganic Chemistry B (780117P and 780118P), Introduction to Organic Chemistry (780116P), and Introductory Laboratory Course (780123P/780127P) passed.

Or General and Inorganic Chemistry I and General and Inorganic Chemistry II (780114P and 780115P), or Introduction to Chemistry (780113P) or Introduction to Physical Chemistry (780101P) and Introduction to Inorganic Chemistry (780102P) or Basic Principles in Chemistry (780109P), Introduction to Organic Chemistry (780103P), and Introductory Laboratory Course (780122P or 780123P) passed.

**Recommended optional programme components:**

Participation in the course 781305A Organic Chemistry I.

**Recommended or required reading:**

Hart, H.: Organic Chemistry: A Short Course, 10. ed or newer, Houghton Mifflin, Boston, 1999; Clayden, J., Greeves, N., Warren, S.: Organic Chemistry, Oxford University Press, 2. ed., 2012.

**Assessment methods and criteria:**

Syntheses, preliminary exercises, laboratory notebook, reports and the preliminary exam passed. The syntheses must be done within the next two years.

**Grading:**

The course utilizes a numerical grading scale 0-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Johanna Kärkkäinen

**Working life cooperation:**

No

**Other information:**

The reports must be returned to the teacher by the given deadline. Otherwise you have to do the work again.

**040911S: Using animals in research - carrying out procedures, 3 op**

**Voimassaolo:** 01.08.2012 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Laboratory Animal Centre

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Voipio Hanna-marja

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

040900S Using animals in research - carrying out procedures 2.5 op

Ei opintojaksokuvauksia.

**755320A: Developmental biology-histology, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Biology

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Veli-Matti Pakanen, Lumi Viljakainen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

751367A Developmental biology-histology 4.0 op

**ECTS Credits:**

5 ECTS credits / 133 hours of work.

**Language of instruction:**

Finnish.

**Timing:**

B.Sc. 1st spring.

**Learning outcomes:**

After completing the developmental biology -part of the course the student is able to name the most important events of embryonic development and the structural changes related to them. The student is also able to describe the principles gene regulation related to embryonic development. After completing the histology-part of the course the student is able to describe the various tissue types and the microscopic structure of important organs and is also able to identify tissue types and organs from microscopic sections.

**Contents:**

“It is not birth, marriage, or death, but gastrulation, which is truly the most important time in your life.” (Lewis Wolpert, 1986). Developmental biology will cover forming of embryonic tissue layers (gastrulation), embryonic induction, signal molecules and the differentiation of the most important tissues and organs (organogenesis). Histology will first cover various tissue types, their cell types and matrix composition. Thereafter, the microscopic structure and tissue composition of various organs and organ systems will be covered.

**Mode of delivery:**

Distance learning, in Moodle.

**Learning activities and teaching methods:**

Lecture videos, exercises, virtual microscopic prepares, independent working on virtual microscope, identification of different tissue types on histologic prepares.

**Target group:**

Compulsory to BS students. Optional to ECO and TEA.

**Prerequisites and co-requisites:**

Introduction to cell biology and physiology (750122P) or equivalent knowledge.

**Recommended optional programme components:**

-

**Recommended or required reading:**

video lecture, material in Moodle, Recommended reading: Scott Gilbert, Developmental Biology 10<sup>th</sup> ed, Sinauer Associates.Inc.U.S. (or older), Sariola, Frilander ym., Solusta yksilöksi: Kehitysbiologia, Duodecim, Helsinki 2003; Gilbert: Developmental Biology, Sinauer Press, 6.ed. 2000, or newer; Young & Heath: Wheater's Functional Histology, Churchill Livingstone, 4. ed. 2000, or newer.

The availability of the literature can be checked from [this link](#).

**Assessment methods and criteria:**

1 exam in developmental biology, 4-5 exams in histology.

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

Numerical grading scale 0 – 5, where 0 = fail.

**Person responsible:**

Doc. Lumi Viljakainen.

**Working life cooperation:**

No.

**Other information:**

-

740074Y: Tutoring/confidential posts, 1,5 op

Opiskelumoto: General Studies



**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Jari Heikkinen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**

1.5 credits

**Contents:**

For this study a student acts as a tutor for a group of new students, as a member of Working group on development of teaching (OKTR) or as a member of working committee of OKTR .

**Learning activities and teaching methods:**

10-20 h tutoring of a small group, autumn yr2-yr3, activity in Working group on development of teaching (OKTR) or in working committee of OKTR. Optional.

**Target group:**

Small group tutors

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Education designer

**Working life cooperation:**

No

**Other information:**

Location of instruction: Linnanmaa, Kontinkangas

**740385A: Virology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

740380A Virology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 spring or M.Sc yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- discuss the major groups of viruses and their infection and replication mechanisms
- present and discuss characteristic features of specific viruses and their relation to pathogenesis and immunity
- describe diagnostic methods and antiviral therapy

**Contents:**

The course covers basic aspects of virology. The main emphasis will be made on viral infection, replication, transcription, proteinsynthesis, virological diagnostics, infection kinetics, defense against viruses, ways of infection, vaccination, and antiviral therapy. The course involves lectures 10h, 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures and student presentations in seminars

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

This module is the same as Virology (743667S). Location of instruction: Kontinkangas

**740384A: Introduction to immunology, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Zhi Chen**Opintokohteen kielet:** English**Leikkaavuudet:**

740379A Introduction to immunology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

B.Sc. yr3 spring or M.Sc yr1-yr2 spring

**Learning outcomes:**

After the course students will be able to understand, identify, analyze and apply essential concepts of cellular and molecular components and mechanisms of immunology, and integrate their previous knowledge of molecular and cellular biology and protein chemistry with immunology and immunobiochemistry instances

**Contents:**

The course handles the basis of immunology, covering cells and mechanisms of innate and adaptive immune responses (inflammation, anti-microbial and anti-viral defenses, T-cell activation, antibody production, etc.). The course also offers insights into the physiopathology of the immune responses (chronic inflammation, allergy, autoimmune disorders, transplantation and cancer) and the clinical (immunotherapy, cytokine therapy, etc.) and industrial (monoclonal antibodies, ELISA and immunodiagnosics, etc.) applications of immunological processes.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (14 h), a written home exercise, and a final exam.

**Target group:**

Major and minor subject undergraduates

**Prerequisites and co-requisites:**

Preliminary required courses: Molekyylibiologia I, Protein chemistry I and Cellular biology, or equivalent basic molecular biology, protein chemistry and cell biology studies.

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Home exercise, final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Zhi Jane Chen

**Working life cooperation:**

No

**Other information:**

This module is the same as 743666S Introduction to immunology. Location of instruction: Kontinkangas campus.

**H325436: Other Optional studies - BSc, 0 - 50 op**

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Intermediate Studies

Laji: Study module

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Set optional amount of credits in "Schedule"*

**740387A: Introduction to microfluidics and lab-on-a-chip devices, 5 - 7 op**

**Voimassaolo:** 01.08.2020 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Caglar Elbuken

**Opintokohteen kielet:** English

**ECTS Credits:**

5-7 credits

**Language of instruction:**

English

**Timing:**

Autumn

**Learning outcomes:**

The students are expected to learn the fundamentals of micro/nanofluidics and be able to apply those concepts to several applications. Another major goal of the course is to give the students enough tools so that they can follow the state-of-the art developments in the field from the leading journals such as RSC Lab on a Chip, Wiley Small, ACS Analytical Chemistry. The students are also very briefly exposed to the recently growing field of nanofluidics through comparisons between micro and nano-scale physics. The students will be introduced with the biosensors and their operating principles

**Contents:**

The goal of this course to cover the fundamentals and the latest developments in the field of micro /nanofluidics and their application areas in sensing and diagnostics. The first half of the course (modules 1-6 below) is intended to cover the fundamental fluidic concepts. The second half of the course (modules 7-12) covers the application areas of microfluidic and LOC systems, such as biosensors and point-of-care diagnostic devices. Finally, the trending topics in the field are covered.

For students interested in a hands-on experience, an extended module with multiple laboratory sessions is available (option-2). The lecture is a pre-requisite to take the laboratory practice session.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures + online exercises

**Target group:**

BSc and MSc level students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

In-class quizzes, homework, term project, final exam

**Grading:**

1-5/fail

**Person responsible:**

Caglar Elbuken

**Working life cooperation:**

-

**Other information:**

Location of instruction: Kontinkangas campus

**740383A: Orientation to research work, 0 - 6 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Intermediate Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** Finnish, English**ECTS Credits:**

0-6 credits

**Language of instruction:**

Finnish/English

**Timing:**

BSc yr1-3

**Learning outcomes:****Learning outcomes:** After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to research work via the active integration of students into research groups and/or via one to two week advanced practical courses. The integration into groups can be either full-time or part-time research work, with 1.5op being awarded for each full-time week equivalent worked. A maximum of 6op can be awarded for working in one research group. The research groups do not need to be in the Faculty of biochemistry and molecular medicine, University of Oulu, but advance permission should be sought if the research group is not part of the University of Oulu.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students (BSc)

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

Pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

Optional course. The maximum sum of credits from courses 740382A and 740383A is 6 credits.

**740382A: Orientation to biochemical work, 0 - 6 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** English, Finnish**ECTS Credits:**

0-6 credits

**Language of instruction:**

Finnish/English

**Timing:**

BSc yr1-2

**Learning outcomes:**

After this course student has gained experience of practical work done in non-research group environment. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to non-research work in companies or other suitable environment. The work can be either full-time or part-time work, with 1.5op being awarded for each full-time week equivalent worked. A maximum of 6op can be awarded for working in one work placements. Each placement must be agreed in advance with the responsible person.

**Mode of delivery:**

Face to face teaching

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Non-research work

**Grading:**

Pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

Optional course. The maximum sum of credits from courses 740382A and 740383A is 6 credits

**740381A: Biochemical and biomedical innovation, 2 - 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English**ECTS Credits:**

2-5 credits

**Language of instruction:**

English

**Timing:**

Can be taken by any BSc / MSc / PhD student

**Learning outcomes:**

The aim of the course is to get student familiar with:

- the core skill set required to recognize opportunities/needs and how to validate creative ideas
- the core skill set of searching patent databases
- the concepts of intellectual property rights (IPR)
- the concepts of how to pitch an idea

**Contents:**

This module covers basic aspects of the key skills required for successful innovation in the field of biochemistry and molecular medicine. Concepts relating to how to recognize opportunities, how to recognize what is needed in the field, creative thinking, validating ideas and how to pitch ideas are covered as well as an introduction to intellectual property rights and patent searching. In addition to workshops /seminars (19 hours) the 5 ECTS version of course requires submission of an invention disclosure/proof of concept funding or submission of an entry to the biochemistry and molecular medicine innovation award.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

19 hours of lectures/workshops

**Target group:**

Major students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

For 2 ECTS participation in at least 70% of seminars/workshops. For 5 ECTS participation in at least 70% of the seminars/workshops plus submission of an invention disclosure / proof of concept funding application to the university (PhD students) or submission of an entry to the biochemistry and molecular medicine innovation award (BSc and MSc students).

**Grading:**

Pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**740078Y: Working life course, 6 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** General Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Henrika Honkanen**Opintokohteen kielet:** Finnish**ECTS Credits:**

6 credits

**Language of instruction:**

Finnish

**Timing:**

B.Sc. yr1-3 spring

**Learning outcomes:**

Upon successful completion students are able to

- describe transferable working life skills, independent of the working environment
- recognize and describe their own skills
- assess themselves as an expert, as an applicant and as an employee
- recognize those working life skills which may need improvement
- compose their "skill profile"

**Contents:**

Workshops will address the generic working life skills which are needed in every working environment. Communication, social interaction, group work, organizing, time management, giving and receiving feedback are among the topics studied. The skills and experiences the students have obtained already, will be recognized and considered in terms of how to best present them when applying for a job for instance. The summer job, which needs to last at least 1 month, can be of any branch. During the summer job, the students will have assignments concerning working life related issues, e.g. safety, working environment or interactions between people at the working place. By the end of the course the students will write a report to describe their experiences reflecting the development of their working life skills. Reports will be evaluated by the teacher and also by a fellow student. Thus also giving constructive feedback to a fellow student will be practiced.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Three workshops (3 x 2-3h) are organized during the Spring before the summer job and one in the Autumn. A small part of the teaching in workshops is lecturing, mostly learning takes place via group work, discussions and assignments. The summer job (min. 1 month) is accompanied with assignments and a final report. Evaluation of a report from a fellow student is included.

**Target group:**

B.Sc. students

**Prerequisites and co-requisites:**



Summer job for at least 1 month. The field of work is not specified.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Info on recommended reading will be given in workshops.

**Assessment methods and criteria:**

Participation in the workshops, summer job, assignments, report, evaluation.

**Grading:**

Pass/Fail

**Person responsible:**

Henrika Honkanen

**Working life cooperation:**

Yes

**Other information:**

Location of workshops (Kontinkangas/Linnanmaa campus) will be announced separately.

**740079Y: Activities in University and Student Organizations, 1 - 10 op**

**Voimassaolo:** 01.01.2017 -

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish, English

**ECTS Credits:**

1-10 ECTS

**Language of instruction:**

Finnish/English

**Timing:**

During academic studies

**Learning outcomes:**

Upon completion of the course, the student will be able to

- apply the skills needed in academic positions of trust (interaction skills, meeting techniques, working in a group, cooperation skills, leadership skills)
- evaluate critically the issues to be decided, take a stand on them and justify his or her viewpoint
- attend to the functions related to his or her position of trust in a responsible manner

**Contents:**

The course can include functions in a number of positions of trust as follows:

- Student Union Board, 1 year, 4-5 credits
- Student Union representatives, 2 years, 2 credits
- University Board of Directors, 1 year, 2 credits
- University Collegium, 2 years, 2 credits
- Education Council, 1 year, 2 credits
- Faculty Board, 2 years, 2 credits
- Board of a subject organization or a student guild, 1 year, 1-3 credits
- National student organization such as SYL, 1 year, 1-5 credits
- Other important functions in the field of education policy and/or development of teaching, such as Education Committee or section of the Student Union, 1-3 credits

The number of credits to be awarded to the student is determined by the Dean of Education based on available documentation following the principles mentioned above.

**Mode of delivery:**

Independent work

**Learning activities and teaching methods:**

Independent report

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The student shall write a learning diary of the position(s) of trust that she or he has been managing, discussing the following issues:

1. Which organization has the student been working in, how long and how actively has s/he been taking part in its activities?
2. What does the student think s/he has learnt from the position of trust? (With special consideration of these working life skills: communication skills, social skills, technical skills, international competence, commercial and financial competence, development of self-knowledge)
3. How can the student make use of his or her experience in the future?
4. In the student's mind, how should the preparation of matters be developed?

The learning diary and proof of having been in charge of a position of trust are returned to the Chief Academic Officer of the Faculty who will determine the number of credits to be awarded. The length of the learning diary is 2 – 5 pages (font 11, line spacing 1).

**Grading:**

Pass/fail

**Person responsible:**

Dean of Education Tuomo Glumoff

**Working life cooperation:**

Active participation in student organizations and in University decision making develops generic working skills.

**Other information:**

The maximum number of credits for the activities mentioned above is 10 credits in one to two parts. The credits can be included in general studies

**ay724102P: Management and Organizations (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724102P Management and Organizations 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

Upon completion of the course, the student will be able to distinguish the concepts related to organization, organizing as well as managerial and entrepreneurial work. This understanding helps the student's ability to identify organizational processes in everyday work-life interventions and to list the possible change factors within a chosen organization. The student is also able to identify different kinds of organizations and can define the different principles of management styles. The student is able to understand various ongoing functions within organizations and their requirements for the organizations' management. The student understands the role of organizational development and learns to register the most essential challenges of management in the current organizations.

**Contents:**

The course covers the topics and questions of organizations and management, human organizing and processes as well as change management. The premises of the course are the traditional management schools of thought (scientific management, human relations school of thought, Hawthorne-studies, etc.) that the course goes through thoroughly. The course builds the newest questions of organizational theoretical approaches (change, processuality, etc.) on this understanding. In the course the students are introduced with the development of organizations and management, by presenting different organization types and management styles as well as the ways how those issues affect organization functioning.

**Mode of delivery:**

lectures, visiting lecturers, case-practices and group works.

**Learning activities and teaching methods:**

lectures (36 hours, including case-practices and group work of 9 hours), reading the course material (45 hours), preparation for the exam (52 hours).

**Recommended or required reading:**

Gareth Morgan (1997 tai uudempi). [Images of organization](#). London: Sage Publications.  
Hannele Seeck (2012 tai uudempi). [Johtamisopit Suomessa](#). Helsinki: Gaudeamus.  
Luentomateriaali.

**Assessment methods and criteria:**

Written exam of lectures and literature.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppsy.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724105P: Management Accounting (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724105P Management Accounting 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After passing the course, the student knows the basic cost concepts and the elements of cost accounting systems. Students are also able to apply the basic cost information in the company's decision making and explain which costs should be included in these calculations under different circumstances.

**Contents:**

Theoretical framework for understanding cost accounting, cost concepts, cost recording, different product costing methods, cost-volume-profit analysis, using cost accounting information in decision making.

**Learning activities and teaching methods:**

20 h lectures, 16 h exercises and independent reading of study materials (97 hours).

**Target group:**

Major students in economics and business administration

**Recommended or required reading:**

[Drury, C.: Management and cost accounting, 7th or 8th ed. Cengage Learning EMEA. Chapters 1-11 \(8th ed.\);](#)

Supplementary material: [Järvenpää, M.- Lämsiluoto, A - Partanen, V. – Pellinen, J.: Talousohjaus ja kustannuslaskenta, WSOYpro, chapters 1-8.](#)

**Assessment methods and criteria:**

Lectures and literature examination.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Working life cooperation:**

Understanding of management accounting systems is typically an important part of work for graduates in economics and business administration and an essential part of occupations like management accountant or controller.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724108P: Financial Markets (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724108P Financial Markets 5.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4

**Learning outcomes:**

The course is an introduction to the role and functions of financial markets and institutions. Upon successful completion of the course, the student will be able to describe the basic structure and operational principles of financial markets and to identify different types of financial instruments and their characteristics.

**Contents:**

1) the role of financial markets and institutions in the economy, 2) main types of financial assets, their properties, and basics of pricing, 3) stock markets, bond markets, markets for bank obligations, treasury securities markets, derivative markets, mutual funds, private equity

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (26 h), visiting lectures (10 h), self-study (94 h), exam (3h)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

[Pilbeam: Finance & Financial Markets \(3<sup>rd</sup> edition\), Palgrave Macmillan](#)

Other material announced during the lectures

**Assessment methods and criteria:**

Examination, lecture diaries

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Prof. Juha-Pekka Kallunki

**Working life cooperation:**

General knowledge of the functions of financial markets and the various market participants

**Other information:**

The number of students is limited.

**ay724110P: Introductory Economics (OPEN UNI), 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724110P Introductory Economics 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Timing:**

Period A. It is recommended that students complete the course during the first autumn semester.

**Learning outcomes:**

After completing the course students (i) understand the basic concepts of economics and the rudiments of economic theory, (ii) can explain the determination of resource allocation and prices in a market economy, (iii) know how the aggregate economy operates in the short and long run, and (iv) how economic policy affects the Finnish economy and also the European economy.

**Contents:**

The course introduces students to the tools and ideas economics uses to describe and explain economic phenomena. The topics include:

- the long-term development of the Finnish and World economy
- basic ideas and principles of economics
- opportunity cost and comparative advantage
- market equilibrium: demand and supply
- how well does market economy work?
- firms and competition in market economy
- aggregate economic activity and its measurement
- business cycles
- monetary and fiscal policy
- economic growth

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

36 lectures including problem sets. Students are expected to do the problem sets on their own and familiarize themselves with the required and recommended materials (93 h). Mid-term exams (2) or Final exam (3 h).

**Target group:**

Sivuaineopiskelijat ja avoimen yliopiston opiskelijat

**Recommended or required reading:**

Material posted at the webpage.

Textbook: [Acemoglu, D., Laibson D. and List, J.A., Economics, 2015](#)

and extra readings: [Timothy Taylor, The Instant Economist. Everything You Need to Know About How the Economy Works. 2012. A Plume Book \(Penguin\), New York NY.](#)

Robert P. Murphy, Lessons for the Young Economist. Ludwig von Mises Institute 2010; [http://mises.org/books/lessons\\_for\\_the\\_young\\_economist\\_murphy.pdf](http://mises.org/books/lessons_for_the_young_economist_murphy.pdf)

**Assessment methods and criteria:**

Final Exam.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Marko Korhonen

**Working life cooperation:**

Students learn relevant and useful facts about the operation of the markets, and the aggregate economy to an extent that they can reasonably utilize those facts and knowledge in the decision making of the business they are working at.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyo.fi/fi/kauppatieteiden-sivuaineopinnot-perusopinnot-25-op-oy-aya633707/>

**ay724111P: Finnish Economy and Economic Policy (OPEN UNI), 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** University of Oulu, Open University

**Arvostelu:** 1 - 5, pass, fail

**Opetus suunnattu:** University of Oulu, Open University

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

724111P Finnish Economy and Economic Policy 5.0 op

**ECTS Credits:**

5 credits / 133 hours of work

**Language of instruction:**

Finnish

**Learning outcomes:**

After the course the student is capable of outlining the economic history of Finland, to describe the position of Finland in the global economy and to evaluate the challenges of the Finnish economy now and the future. In addition, the student can describe the main features of the different areas in the Finnish economy.

**Contents:**

The course provides an overview of the Finnish economy and economic history, its current state and future development. The course deals with the activities of the Finnish economy and development, such as globalization, regional economy and general economic policy.

Lectures will include the following themes

1. The Finnish economy from the late 1800s to the early 2000s
2. Productivity and economic growth
3. Globalisation and Finland
4. Regional development and regional policy in Finland
5. Fiscal policy
6. Public economics and challenges of welfare state
7. Finance and economic development in communes
8. Innovations and innovation policy

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

36 h lectures, reading the course literature (93 h) and exam (4 h).

**Recommended or required reading:**

Announced by the lecturer.

**Assessment methods and criteria:**

Lecture- and literature examination and course assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Other information:**

**Ilmoittautuminen ja lisätiedot:** Pohjois-Pohjanmaan kesäyliopisto <https://www.ppkyyo.fi/fi/kauppatieteiden-sivuaieopinnot-perusopinnot-25-op-oy-aya633707/>

**555225P: Basics of industrial engineering and management, 5 op****Voimassaolo:** 01.01.2014 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Field of Industrial Engineering and Management**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Elina Jääskä**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay555225P Basics of industrial engineering and management (OPEN UNI) 5.0 op

555221P Introduction to Production 2.0 op

555220P Basic Course in Industrial Engineering and Management 3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Period 1.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe what industrial engineering and management (or operations management) means
- explain the core concepts of business operations and utilise these concepts in describing and analysing operations of an organisation
- explain in general terms the factors that affect economic performance of organisations
- utilise the terminology used in industrial engineering and management (operations management), describe the financial processes of companies and based on this describe the use of cost accounting in organisational decision-making
- calculate unit costs in various simplified settings, calculate various alternatives, as well as perform planning and goal oriented calculations based on given data, and draw conclusions based on the calculation results

**Contents:**

Operations and productivity, operations strategy, forecasting, accounting and cost accounting, investments and financial planning, sustainability, capacity management, location decisions, layout strategies, human resources management, supply chain management, subcontracting, inventory management, production planning, MRP & ERP, production scheduling, Just-in-Time & Lean operations, maintenance.

**Mode of delivery:**

Web-based teaching 20 hours / practices 14 hours / Independent studying 100 hours.

**Learning activities and teaching methods:**

Web-based lectures 20 h / exercises 14 h / self-study 100 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555285A Project management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture and exercise materials. Heizer, J. & Render, B. (2014) Operations management: sustainability and supply chain management, 11th ed. Pearson. In addition, recommended materials include Martinsuo, M. et al. (2016) Teollisuustalous kehittyvässä liiketoiminnassa chapters 7-9, 16 and 26.

**Assessment methods and criteria:**

This course utilises continuous assessment. During the course, there are seven mandatory weekly assignments.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

MSc (Tech.) Elina Jääskä

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555220P Basic Course in Industrial Engineering and Management 3 ECTS cr and 555221P Introduction to Production 2 ECTS cr.



**555242A: Product development, 5 op****Voimassaolo:** 01.01.2014 -**Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Field of Industrial Engineering and Management**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Haapasalo, Harri Jouni Olavi**Opintokohteen kielet:** English**Leikkaavuudet:**

ay555242A	Product development (OPEN UNI)	5.0 op
555240A	Basic Course in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

English.

**Timing:**

Periods 1-2.

**Learning outcomes:**

This course introduces product development and innovations management in a company environment. The course provides fundamental understanding over tools and frameworks that can be used for analysing and managing products, innovations, and technology development. The aim is to create a connection between product development and other company functions. Upon completion of the course, the student will be able to

- explain the role of product development as a company function
- understand the difference between innovation activities and systematic product development, and knows the difference between different phases of product development process and its activities
- transform customer needs into requirements for product development process and finally into product features
- define the meaning of other company functions to product development activities

**Contents:**

Meaning of products for the operations of an industrial enterprise, product development paradigm and defining relevant concepts, realising product development methodologically (U&E model, Cooper's stage-gate model, QFD), managing innovations, and product development success factors.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching.

**Learning activities and teaching methods:**

Lectures 20 h / exercises 6 h / group work and self-study 108 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

555226A Operations and supply chain management (Operations and production)

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Handouts, course work, and a collection of articles. Ulrich, K. & Eppinger, S. (2008) Product Design and Development. McGraw-Hill. 358 p.

**Assessment methods and criteria:**

Exam and group work.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Professor Harri Haapasalo.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555240A Basic Course in Product Development.

**555285A: Project management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

555288A	Project Management	5.0 op
ay555285A	Project management (OPEN UNI)	5.0 op
555282A	Project Management	4.0 op
555280P	Basic Course of Project Management	2.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. Check the course in English 555288A Project Management.

**Timing:**

Period 2.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- describe explain the essential concepts and methods related to project management
- apply project management methods to create a schedule for a project and calculate critical path
- understand essential concepts related to project cost management and able to apply earned value method and three point estimate to manage project costs
- recognises the essential tasks of project risk management

**Contents:**

Defining project management, project goals and objectives, project phases and project life-cycle management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management, project stakeholder management, project communications management, the role of project manager, new modes of project delivery

**Mode of delivery:**

The tuition will be implemented as web-based teaching.

**Learning activities and teaching methods:**

Web-based lectures 16h, self-study 118h

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555242A Product development, 555264P Managing well-being and quality of working life, and 555286A Process and quality management.

**Recommended or required reading:**

Lecture material, exercise book, Arto, Martinsuo & Kujala 2006. Projektiliiketoiminta. WSOY

**Assessment methods and criteria:**

Weekly assignments and final online exam

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Assistant professor Kirsi Aaltonen

**Working life cooperation:**

Videos from the industry's projects

**Other information:**

Substitutes courses 555280P Basic Course of Project Management + 555282A Project Management.

**555264P: Managing well-being and quality of working life, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Arto Reiman

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555264P	Managing well-being and quality of working life (OPEN UNI)	5.0 op
555261A	Basic Course in Occupational Psychology	3.0 op
555262A	Usability and Safety in Product Development	3.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish. English material is also used.

**Timing:**

Periods 3-4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- set targets and choose appropriate methods of developing well-being at work both at personal and organizational levels
- develop well-being at work in the contexts of labor legislation, good practices, productivity, occupational safety expertise, management and human resources
- know the key sources of information, typical goal-setting and management practices and the methods for assessing the performance at individual and organizational levels
- assess the economic impacts of well-being at work, especially in cases of work ability, occupational health, job satisfaction, occupational safety, productivity and the overall quality of working life
- know essential national and international regulation and strategic goal setting practices, good practices of the case companies, current trends, and methods in research.

**Contents:**

The course gives the student a vision of building sustainable, productive and satisfactory career. The contents cover the whole area of basic quality issues of working life analysing them in the following framework "Well-being at work means safe, healthy, and productive work in a well-led organisation by competent workers and work communities who see their job as meaningful and rewarding, and see work as a factor that supports their life management".

**Mode of delivery:**

The tuition will be implemented as blended teaching (web-based teaching and face-to-face teaching).

**Learning activities and teaching methods:**

Lectures 10 h / self-study 70 h / group work & exercises 42 h.

**Target group:**

Industrial Engineering and Management students and other students taking Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

No prerequisites exist.

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial Engineering and Management that also includes 555225P Basics of industrial engineering and management, 555285P Project Management, 555242A Product development, and 555286A Process and quality management.

**Recommended or required reading:**

Applicable parts of Arnold, J. et al. (2010), Work Psychology; Understanding Human Behaviour in the Workplace. 5th Edition. Financial Times/Prentice Hall and Aura, O. & Ahonen, G. Strate-gisen hyvinvoinnin johtaminen, Alma Talent. Other literature will be informed during the course.

**Assessment methods and criteria:**

This course utilises continuous assessment including exercises during the lectures (weight 20 %), group work (weight 40 %) and examination (weight 40 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Dr. Arto Reiman

**Working life cooperation:**

-

**Other information:**

Substitutes courses 555261A Basic Course in Occupational Psychology + 555262A Usability and Safety in Product Development.

**555286A: Process and quality management, 5 op**

**Voimassaolo:** 01.01.2014 -

**Opiskelumuoto:** Intermediate Studies

**Laji:** Course

**Vastuuyksikkö:** Field of Industrial Engineering and Management

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Osmo Kauppila

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay555286A Process and quality management (OPEN UNI) 5.0 op

555281A Basic Course of Quality Management 5.0 op

**ECTS Credits:**

5 ECTS credits.

**Language of instruction:**

Finnish.

**Timing:**

Period 4.

**Learning outcomes:**

Upon completion of the course, the student will be able to:

- explain the role of process and quality management in a business organisation
- develop business processes based on the principles of quality management and appropriate tool

**Contents:**

Foundations of total quality management, planning of quality, performance measurement, process management, people management in relation to quality management, implantation of total quality management.

**Mode of delivery:**

The tuition will be implemented as face-to-face teaching (integrated classroom lectures and exercises).

**Learning activities and teaching methods:**

20 h lectures, 114 h independent study

**Target group:**

Industrial Engineering and Management students and other students studying Industrial Engineering and Management as minor.

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of the 25 ECTS module of Industrial engineering and management that also includes 555225P Basics of industrial engineering and management, 555285A Project management, 555242A Product development, and 555264P Managing well-being and quality of working life.

**Recommended or required reading:**

Oakland, J.S. (2014) Total quality management and operational excellence (4th ed.). Routledge, 529 pp. and material handed out during the course.

**Assessment methods and criteria:**

To pass the course, the student must pass the weekly course exercises (50 % of the course grade) and an exam (50 %).

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

University lecturer Osmo Kauppila.

**Working life cooperation:**

No.

**Other information:**

Substitutes course 555281A Basic Course of Quality Management.

**724811P: Entrepreneurship for Sustainability, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Oulu Business School**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Anne Keränen**Opintokohteen kielet:** English**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 2

**Learning outcomes:**

After the course the students should:

Understand the roles of entrepreneurship in creating socially responsible change in society, know how to map and analyze alternative sustainable entrepreneurial business ideas based on individual strengths, values and the UN SDGs, know creative problem solving assessment methods, know how to communicate about entrepreneurial ideas.

**Contents:**

Course description

The course outlines interdisciplinary skills and knowledge that foster the creation of a sustainable entrepreneurial mindset. These skills include problem solving, creativity, networking, communications, risk-taking and adaptability. Entrepreneurship is approached through its different forms and roles in various contexts of society, ecosystems, and businesses. The focus is on entrepreneurial mindsets, responsible business and what entrepreneurship requires from individuals and teams, especially from the "me/us as entrepreneur" standpoint. During the course students familiarize themselves with the role of business and entrepreneurship in building sustainable societies. In addition, students have the opportunity to present their sustainable business ideas to responsible business experts.

Course objectives

Students develop skills for creative problem solving; students understand that entrepreneurial behavior can take place within many contexts (new ventures, associations, government agencies, and existing businesses); students identify their alternative roles, opportunities, and viewpoints regarding entrepreneurial choices they can make; students strengthen their skills of responsible business and are able to assess choices for business as promotor of social change based on the UN Sustainable Development Goals; students are able to define and assess alternative contexts for entrepreneurial action and to create and assess alternative business scenarios for their future; students are able to recognize and analyze business opportunities and social/customer problems and challenges; students are able to create and evaluate alternative solutions to the identified opportunities, problems, and challenges of responsible business; students are able to communicate effectively about their entrepreneurial ideas.

**Mode of delivery:**

Lectures, workshops and online learning

**Learning activities and teaching methods:**

Learning takes place mostly in groups by means of intensive lectures and workshops, visitor presentations and discussions, both in class and via online learning platform. The course includes 36 contact hours. Reading the course literature (20 h), Groupwork (80 h) and learning diary report (35 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Further details will be provided by the responsible persons in the first session.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Anne Keränen and Jan Hermes

**Working life cooperation:**

The course incorporates real life case examples and meetings with sustainable entrepreneurship practitioners and experts. Students learn interdisciplinary skills that can be applied in real working life.

**Other information:**

The number of students is limited.

**724812P: Building Change Through Entrepreneurship, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ahmad Arslan

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay724812P Building Change Through Entrepreneurship (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 3

**Learning outcomes:**

After the course completion, the students should:

1. Have the basic knowledge about start-ups and new business creation
2. Have the ability to find and utilize information for new business creation
3. Have the knowledge how to analyze own business-case
4. Have the knowledge how the to plan a new start-up
5. Have the ability to present own business-case

**Contents:**

Lectures will focus on the following themes:

Introduction to Entrepreneurship

Recognizing Opportunities and Generating Ideas

Feasibility Analysis

Industry and Competitor Analysis

Developing an Effective Business Model

Building a New Venture Team

Assessing New Venture's Financial Strength and Viability

Writing a Business Plan

Getting Finance or Funding  
 Preparing for and Evaluating Challenges of Growth

**Mode of delivery:**

Face-to-face teaching complemented with online resources

**Learning activities and teaching methods:**

The course consists of lectures and workshops (32 h), preparation for lectures and workshops (18 h), and, reading the literature and preparation for assignments (50 h), and writing the assignments (40 h).

**Target group:**

B.Sc. and M.Sc. students from different faculties in the university as well as exchange students

**Prerequisites and co-requisites:**

None

**Recommended optional programme components:**

None

**Recommended or required reading:**

- Bruce R. Barringer and R. Duane Ireland (2006). Entrepreneurship: Successfully Launching New Ventures. Pearson Education.
- Slides and relevant online resources

**Assessment methods and criteria:**

Individually written assignments. Completion of 10 assignments correspond to revving grade 5, while minimum two are needed to get 1 in order to pass the course

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Ahmad Arslan and Anne Keränen

**Working life cooperation:**

Practical insights to new business creation tested through several assignments addressing different aspects associated with it.

**Other information:**

The student number is limited to 50.

**724813P: Entrepreneurship in Action, 5 op**

**Voimassaolo:** 01.08.2017 - 31.12.2020

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Niina Karvinen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Periods 1-4

**Learning outcomes:**



Upon completion of the course, the students can apply the core competencies of his/her studies in a real-life entrepreneurship context. Students can realize and start working with a business opportunity or social problem in practice to find a solution. The student will improve his/her entrepreneurial skills; multicultural group working, problem solving, communicating and presenting.

**Contents:**

In these studies students generally co-operate in workshops where they learn practical methods of entrepreneurship like business model creation and validation processes, lean methodology, marketing, branding, basic financial management and presenting ideas e.g. pitching.

**Mode of delivery:**

Face-to-face teaching and coaching.

**Learning activities and teaching methods:**

Bootcamps, workshops, group work, individual guidance. Most of the exercises are completed as group work (132 h).

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

No

**Recommended or required reading:**

Selected readings are provided during the course

**Assessment methods and criteria:**

Programme specific assessment that may include both group and individual assessment methods.

**Grading:**

The course utilizes grading scale "pass/fail"

**Person responsible:**

Niina Karvinen ja Anne Keränen

**Working life cooperation:**

The programs of this course are run in close co-operation with relevant business partners or applied to practice. Students also learn practical entrepreneurship skills.

**Other information:**

The number of students is limited

**724814P: Introduction to Business Development, 5 op**

**Voimassaolo:** 01.08.2017 - 31.07.2021

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Antti Muhos

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 1

**Learning outcomes:**

Students are familiar with basic business concepts and theories in SME context. On successful completion of the course, students understand the business development process from opportunity recognition to a launch and development of a sustainable business. The students are able to identify basic business processes in practice.

**Contents:**

The course focuses on the basic concepts of SME business management and development including opportunity recognition, experimentation and testing of a new business idea, strategy, business model development and business planning, financing and planning and management of growth and change.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

Face-to-face teaching including lectures, guest lectures, company visit/s and variable action-based learning methods (36h). Individual assignment (20h) and reading of course materials (76 h).

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Selected readings from e.g.: Spinelli & Adams. 2012, 2016. New Venture Creation: Entrepreneurship for the 21st Century. McGraw-Hill, New York. Allen, K. 2012. New venture creation. South-Western. Moreover, additional materials are provided during the course.

**Assessment methods and criteria:**

Learning diary, group assignment/s

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for fail.

**Person responsible:**

Matti Muhos

**Working life cooperation:**

This course is designed as an integral part of entrepreneurship studies. This course will include real life case studies of established and emerging businesses by company visits.

**Other information:**

The number of students is limited

**724815P: Entrepreneurial Assignment, 5 op**

**Voimassaolo:** 01.06.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Sari Perätalo

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

The schedule for the course is dependent on the entrepreneurial event or training in which student takes part in.

**Learning outcomes:**

Upon completion of the course the students are familiarized with entrepreneurial activity in society and possess skills that help to solve entrepreneurial problems and make change. Students will have an insight into the diversity of entrepreneurship and gain understanding of the specific aspects of entrepreneurship.

**Contents:**

Studies are tailored upon acceptance by the course instructor. The course consists of two parts: practice, and theory. Students compile the course through participating in different entrepreneurship supporting activities. The students can for example participate in Tellus boot camps, events or volunteering program. In addition, students can include activities organized by other stakeholders (e.g. faculties, public organizations or third sector organizations). In addition, the students reflect their learning in a report.

**Mode of delivery:**

Face-to-face teaching including entrepreneurial project, event, workshop, etc. Individual written assignment and reading the agreed materials.

**Learning activities and teaching methods:**

Individual and group work (132h). Teaching methods vary depending on the entrepreneurial project, event, workshop, etc. a student has participated in.

**Target group:**

Open to all university students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course.

**Assessment methods and criteria:**

Assessment is based on an individual report that a student is expected to deliver after participating in an entrepreneurship-related event, workshop, project, etc.

**Grading:**

The course utilizes verbal grading scale "pass/fail".

**Person responsible:**

Sari Perätalo

**Working life cooperation:**

The course allows the students to gain first-hand entrepreneurial experience in various forms.

**Other information:**

Contact the responsible teacher to enroll in the course.

**724816P: Building Business Through Creativity and Collaboration, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anne Keränen

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

Period 4

**Learning outcomes:**

During the course the student will explore entrepreneurship from the perspective of an artistic process and learn the process of designing improbable solutions. The students are challenged to question mainstream values, assumptions taken for granted, and ways of doing things. The course gives the student tools that are needed in developing improbable business models and solutions that can shift paradigms.

During the intensive workshops of the course, the student will work in teams and learn to regulate emotions, such as uncertainty, frustration, enthusiasm, and joy.

Upon completion of the course, the student will:

- develop entrepreneurial leadership
- increase abilities to build new inspiring visions
- master agile methods of creation to deal with uncertainty and risks
- learn how to use diversity and improbable encounters to develop business
- connect passion and convictions with a project which creates value
- leverage failure to increase creativity and resilience

**Contents:**

Entrepreneurs develop activities that aim to challenge the status quo, break rules and subvert systems. Furthermore conflicts, emotional strains and uncertainties are often part of entrepreneurship. But how can such things be taught/learned?

The course introduces Art Thinking, an agile method to create improbable outcomes with certainty. The method enables out-of-the-box thinking and creative productions where encounters of all sorts are key resources. Instead of writing business plans, the participants create during the Improbable workshops artistic prototypes and organize an art exhibition.

During the Improbable workshops students will be taught the Art-Thinking Method which involves 6 main activities. The students will:

- (1) engage in gift-giving practices which foster new and unusual partnerships (Donate);
- (2) "steal" from others to create unique propositions (Deviation);
- (3) follow a journey without a clear goal but which will eventually make a lot of sense (Drift);
- (4) challenge existing rules and values as well as their taken-for-granted assumptions (Destruction);
- (5) accept criticism to learn from others (Dialogue), and
- (6) exhibit their work to get feedback and find new partners (Display).

**Mode of delivery:**

Face-to-face sessions and workshops

**Learning activities and teaching methods:**

Participation in the workshops. Producing a piece of art and presenting it at an art exhibition together with others. Completion of the group work and individual tasks, such as reading course materials and reflecting the learning experiences.

**Target group:**

Open to all University Students

**Prerequisites and co-requisites:**

No

**Recommended optional programme components:**

The course is an independent entity and does not require additional studies carried out at the same time.

**Recommended or required reading:**

Materials will be provided during the course

**Assessment methods and criteria:**

Compulsory participation and commitment to the teamwork. Assessment of the course tasks.

**Grading:**

The course utilizes verbal grading scale "pass/fail"

**Person responsible:**

Mia Kemppaala, Anne Keränen

**Working life cooperation:**

Students learn practical entrepreneurial skills through artistic process.

**Other information:**

The number of students is limited

**H325431: Studies in biochemistry in other universities / abroad - BSc, 0 - 75 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Basic Studies**Laji:** Study module**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*Studies taken/ planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

**746102P: Basic studies in biochemistry in other universities, 0 - 75 op****Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Renata Prunskaitte-Hyyryläinen**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

**746103P: Basic studies in biochemistry passed abroad, 0 - 75 op****Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Renata Prunskaitte-Hyyryläinen**Opintokohteen kielet:** English**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746300A: Intermediate studies in biochemistry in other universities, 0 - 75 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Renata Prunskaitte-Hyyryläinen

**Opintokohteen kielet:** Finnish  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **746304A: Intermediate studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Intermediate Studies  
**Laji:** Course  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Renata Prunskaitė-Hyyryläinen  
**Opintokohteen kielet:** English  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **746609M: Studies in other universities/institutes, 0 - 50 op**

**Voimassaolo:** 01.08.2014 -  
**Opiskelumuoto:** Other Studies  
**Laji:** Course  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Renata Prunskaitė-Hyyryläinen  
**Opintokohteen kielet:** Finnish  
**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

#### **H325437: Optional courses available in Oulu - Molecular Medicine Double Degree, 60 - 90 op**

**Voimassaolo:** 01.08.2017 -  
**Opiskelumuoto:** Advanced Studies  
**Laji:** Study module  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

*You must select 60-90 credits of these courses*

#### **744691S: MSc thesis (Pro gradu), 30 op**

**Voimassaolo:** 01.08.2017 -  
**Opiskelumuoto:** Advanced Studies  
**Laji:** Diploma thesis  
**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Alexander Kastaniotis  
**Opintokohteen kielet:** English

**ECTS Credits:**

30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis work students have:

- increased appreciation of how research leads to knowledge and developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management
- developed skills in retrieving, critically appraising and integrating information as well as skills in communicating science and making and defending scientific arguments

**Contents:**

This module provides an extensive 3 month project in a research group as well as a written MSc thesis. The experimental work can be started after 30 cp of Masters studies have been completed, but it is recommended that the MSc thesis work is the final module taken in the MSc. Students are responsible for finding a suitable research group in academia or in industry in which they wish to undertake the MSc thesis work. The work may be undertaken in the research groups of the Faculty of Biochemistry and Molecular Medicine or in any other suitable research group in Finland or abroad. Students should produce a short (typically 2 page) study plan detailing the proposed content of their MSc thesis work, supervisor(s), location of the research work and start date. This should be produced at least 2 weeks before the proposed start date and must be approved before they start work. The MSc thesis is based only on the work done during the first 3 months of work (plus a possible extension of 5-20cp, see 744692 MSc thesis, additional experimental work) by the student on the project, except in cases of mitigating circumstances. The MSc thesis (typically 50-60 pages long) is based on the experimental work undertaken by the student and the contextualization of the research and the results based on published literature in the field. For detailed instructions see <http://www.oulu.fi/fbmm> The thesis must be submitted within 1 year of the start date, except in cases of mitigating circumstances.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

At least 30cp of MSc level studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**Written thesis. Read more about assessment criteria at <http://www.oulu.fi/fbmm>**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

-

**744692S: MSc thesis, additional experimental work, 0 - 30 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** English**ECTS Credits:**

5-30 credits

**Language of instruction:**

Variable, typically English

**Timing:**

MSc yr 1-yr2

**Learning outcomes:**

After the MSc thesis additional experimental work students have:

- increased appreciation of how research leads to knowledge
- developed abilities to identify and solve practical problems, to design and execute experiments and how to record and critically evaluate data
- developed abilities to work independently and as part of a team including self-motivation, diplomacy, planning, organizational skills and time management

**Contents:**

This module provides additional experimental time for the MSc thesis work in 5cp blocks. Students should carefully consider the balance between the time required for the experimental part of the MSc thesis based on the topic chosen versus the benefits of additional courses in biochemistry, ancillary subjects or a minor in another subject. If additional experimental work is planned before the start of the thesis this should be indicated on the study plan (see 747691S MSc thesis). If there are proposed changes to the length of the experimental work during the MSc thesis the responsible person should be notified.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

747691S MSc thesis is a co-requisite

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Experimental work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes



**Other information:**

-

**744635S: Protein production and analysis I, 5 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

42 contact hours (includes 8 hours of problem solving classes plus other exercises)

**Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

BSc in biochemistry or a closely related subject

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (problem solving exercises)

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**744627S: Molecular biology II, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Elitsa Dimova**Opintokohteen kielet:** English**Leikkaavuudet:**

744621S Molecular biology II 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

After the course students are able to:

- describe the general features of DNA manipulating enzymes and CRISPR-Cas9
- design (on paper or in silico) oligonucleotides for PCR amplification
- design and set up restriction digests and ligation reactions in order to carry out basic and advanced cloning procedures
- analyze experimental results from basic cloning procedure
- use basic datasets and basic online bioinformatics tools for genetic engineering

**Contents:**

This module provides a "real-life" approach to practical molecular biology, including DNA cloning strategies, site directed mutagenesis, generation of transgenic mice, etc. It comprises concept overview lectures, complex problem solving based exercises and includes written reports and student presentations. Attendance of the course is required.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

18 h seminars, plus student presentations

**Target group:**

Major students

**Prerequisites and co-requisites:**

The course is designed for MSc students familiar with DNA organization, gene structure & genetic concepts (ORF, codon, heterologous and homologous recombination).

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

This course utilizes continuous assessment based on problem solving based exercises, written reports, student presentation, and crossword solutions. All tasks should be passes by minimum of 60%. Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

pass/fail

**Person responsible:**

Elitsa Dimova

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744636S: Protein production and analysis II, 5 op****Voimassaolo:** 01.08.2020 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 contact hours +80 hours of lab

**Target group:**

MSc students in Biochemistry

**Prerequisites and co-requisites:**

PPA I or equivalent. This course cannot be taken by people who have done Protein Chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment

**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**744628S: Orientation to research work, 0 - 15 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Practical training**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Alexander Kastaniotis**Opintokohteen kielet:** English**Leikkaavuudet:**

744617S Orientation to research work 0.0 op

**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to research work via the active integration of students into research groups and/or via one to two week advanced practical courses. The integration into groups can be either full-time or part-time research work, with 5op being awarded for each three full-time weeks equivalent worked. The research groups do not need to be in the Faculty of Biochemistry and Molecular Medicine, University of Oulu, but advance permission should be sought if the research group is not part of the University of Oulu.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744628S and 744626S (Orientation to biochemical work) must be 10-20 credits.

**744629S: Orientation to biochemical work, 0 - 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Practical training

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744624S Orientation to biochemical work 0.0 op

**ECTS Credits:**

0-20 credits

**Language of instruction:**

English/Finnish

**Timing:**

MSc yr1

**Learning outcomes:**

After this course student has gained experience of practical work done in research groups. Student is able to:

- demonstrate goal-oriented teamwork
- apply methods used in proper environment
- discuss the practical work done and reflect his knowledge

**Contents:**

This module provides an introduction to non-research work in companies or other suitable environment. The work can be either full-time or part-time work, with 5op being awarded for each three full-time weeks equivalent worked. Each placement must be agreed in advance with the responsible person.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Independent work

**Target group:**

MSc in Protein Science and biotechnology or MSc in Molecular Medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work

**Grading:**

pass/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

Yes

**Other information:**

The sum of credits from courses 744629S and 744628S (Orientation to research work) must be 10-20 credits.

**743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op****Voimassaolo:** 01.03.2016 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Karppinen, Peppi Leena Elina**Opintokohteen kielet:** English**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- Present and discuss the basic mechanisms involved in regulation of oxygen homeostasis on cellular, tissue, organ/organism level
- To integrate/adapt regulation of oxygen homeostasis under normal physiological conditions to pathological situations
- Display an understanding on how the basic biochemical knowledge translates from the bench to the bedside
- Understand the meaning of translational research

**Contents:**

General physiology of hypoxia, Hypoxia response in bacteria, Hypoxia response in yeast, Hypoxia-inducible factors (HIFs), Regulation of HIFs on the transcriptional, translational and post-translational level, Conditions related to hypoxia response (erythropoiesis and iron regulation, angiogenesis and metabolism), Experimental models to study hypoxia, HIFs and HIF prolyl 4-hydroxylases as drug targets. Lecture topics may vary.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 22 h seminars (obligatory) and 4 h round table discussions (obligatory).

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles.

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Peppi Karppinen

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743665S: Molecular, cell biological and genetic aspects of diseases, 5 op****Voimassaolo:** 01.08.2016 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Valerio Izzi**Opintokohteen kielet:** English**Leikkaavuudet:**

740396A	Molecular, cell biological and genetic aspects of diseases	5.0 op
743659S	Biochemistry of cell organelles	3.0 op
743604S	Biochemistry of inherited diseases	3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon completion the student should be able to:

- based on biogenesis, structure and function of the key cell organelles discuss their role in pathology and describe organelle-specific disease mechanisms
- describe typical inherited diseases in terms of their occurrence, biochemistry behind their origin, and their analysis and treatment possibilities
- present and defend a scientific presentation on a theme related to inherited diseases.

**Contents:**

The course provides knowledge on structure and function of mitochondria, peroxisomes, endoplasmic reticulum (ER) and the Golgi apparatus, and diseases - also inherited ones - concerned with these cell organelles; as well as gene defects, their inheritance, detection and correction with gene therapy. The course involves student presentations of latest findings on inherited diseases as pair work.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

34 h lectures and seminars including student presentation and student opponents. Seminars are obligatory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

B.Sc. in biochemistry or biology or otherwise adequate knowledge on basic biochemistry and cellular and molecular biology.

**Recommended optional programme components:**

-

**Recommended or required reading:**

Lecture notes, student seminar presentations, research articles. Recommended accompanying texts: Thompson & Thompson, Genetics in Medicine; Strachan, T., Read, A.P.: Human Molecular Genetics, Bios. Scientific Publishers Limited; Aula et al., Perinnöllisyyslääketiede

**Assessment methods and criteria:**

Seminars and exam. 1/5 of the grade is based on the seminar presentation and opponent work and 4/5 on the exam in which the student must display an understanding on how the basic biochemical knowledge translates from the bench to the bedside.

**Grading:**

1-5/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas

**743662S: Extracellular matrix, 5 op**

**Voimassaolo:** 01.08.2015 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Heljasvaara, Ritva-Leena

**Opintokohteen kielet:** English

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- Describe the structure and key components of the mammalian ECM
- Describe the main significance of the ECM for cell and tissue function
- Outline the roles of ECM in inherited connective tissue disorders and in common other diseases



- Identify connective tissue and some of its components in tissue samples using various staining protocols (laboratory work).
- Summarize background knowledge of ECM sufficiently to feel comfortable in undertaking a postgraduate research project in the ECM field

**Contents:**

Besides including basic background knowledge on the ECM, the course will highlight the ECM-related topics that are currently being investigated at the Faculty of Biochemistry and Molecular Medicine. Orientation to mouse and cell models of ECM molecules will form a crucial part in teaching. Contents of lectures in 2019: Collagens and collagen-related hereditary diseases; Proteoglycans and glycoproteins; Basement membranes; Pericellular matrix of the vasculature; Integrins and other ECM receptors; Matricellular proteins; Elastic fibres; ECM plasticity and remodeling; ECM degrading enzymes; Stem cell microenvironments; ECM in fibrosis and cancer. The course has limited enrollment for 28 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

23 h lectures, 6 h seminars, and 36 h laboratory work. Seminars and laboratory work are compulsory

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

**Extracellular Matrix Biology** Eds. Richard O. Hynes and Kenneth M. Yamada, 2011. Cold Spring Harbor Perspectives in Biology  
[http://cshperspectives.cshlp.org/site/misc/extracellular\\_matrix\\_biology.xhtml](http://cshperspectives.cshlp.org/site/misc/extracellular_matrix_biology.xhtml)

**Assessment methods and criteria:**

Continuous assessment, final exam

**Grading:**

1-5/fail

**Person responsible:**

Ritva Heljasvaara

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**743668S: Tumor cell biology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

743657S Tumor cell biology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- name, list and discuss the major aspects including formation of a tumor cell
- present, describe and discuss characteristic aspects of oncogenes and tumor suppressor genes
- use methods to study, examine and to analyse tumor genesis and tumor progression

**Contents:**

The course covers basic aspects of the main pathways inducing formation of a tumor. The main emphasis will be made on modes of carcinogenesis, tumor metabolism, the formation of oncogenes, the action of tumor suppressor genes and the induction of tumors by viruses.

The course covers also aspects of tumor diagnostics and therapy. The course involves lectures 20h with included 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures and student presentations upon request in seminars

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**743663S: Developmental biology, stem cells and tissue engineering, 5 op****Voimassaolo:** 01.08.2015 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Aleksandra Rak-Raszewska, Vainio Seppo**Opintokohteen kielet:** English**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

Upon completion of the course the student have obtained an overview of how the development of tissues and organs is regulated and executed via developmental gene regulation and developmental programs behind morphogenesis. Students will become familiar with the classical and modern experimental embryological techniques during lectures and also with hands-on laboratory work.

**Contents:**

The course provides knowledge on use of various model organisms, basic information about embryology and early developmental mechanisms and signaling molecules. Introduces detailed description of development of few organ systems and provides knowledge about classical and novel study techniques to discover new developmental ques. The course has limited enrollment for 16 students. Lecture part (2 credits) is open for all students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 h lectures and seminars, 3 assessments and 25 h laboratory work. Lectures (100% attendance), assessments and laboratory work are compulsory.

**Target group:**

MSc / Molecular medicine

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, no exam

**Grading:**

1-5/fail

**Person responsible:**

Seppo Vainio and Aleksandra Rak-Raszewska

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744634S: Introduction to big data analysis and bioinformatics models, 5 op**

**Voimassaolo:** 01.08.2019 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Valerio Izzì

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744640S Data mining and data-based models 5.0 op

740393A Data mining and data-based models 5.0 op

**ECTS Credits:**

5 cr

**Language of instruction:**

English

**Timing:**

Spring

**Learning outcomes:**

Upon completion the student should be able to:

- Identify, retrieve and contextualize knowledge from major online biomedical sources
- Identify, retrieve and analyze big biomedical data using open access resources and responsive databases
- Develop investigational pipelines for biomedical hypothesis and researches using available open data

**Contents:**

General principles of data identification, mining and analysis. Textual and contextual data evaluation. Repositories and databases of biomedical interest. Data analysis using open-access online tools, with examples from clinical and molecular studies. Machine learning. Multi-Omics integration. Contents may vary.

**Mode of delivery:**

Face to face teaching and online

**Learning activities and teaching methods:**

12 h lectures + online exercises

**Target group:**

MSc / Molecular medicine or Protein science and biotechnology

**Recommended or required reading:**

Lecture notes

**Assessment methods and criteria:**

Evaluation of assignment completion online

**Grading:**

pass/fail

**Person responsible:**

Valerio Izzi

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**747616S: Biochemical methodologies II, 10 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Ulrich Bergmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747608S Biochemical methodologies II 8.0 op

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

MSc 1st spring

**Learning outcomes:**

Upon successful completion students are able to:

- describe the theoretical basis of the main biochemical analysis methods for proteins
- use the different instruments
- describe the potential of the different analytical techniques and develop strategies for addressing specific questions in protein & proteome-analysis
- integrate data from multiple sources and evaluate it critically

**Contents:**

During this module students will analyze their own protein samples. The course will cover principles and practical applications of some of the more advanced methodologies used in practical biochemistry, including chromatography, fluorescence spectroscopy, stopped flow analysis of enzymatic reactions, circular dichroism, surface plasmon resonance, micro-calorimetry, mass spectrometry, and proteomics based on 2D electrophoresis and LCMS. For assessment each student has to write four research reports in the style of a scientific publication. Attendance is compulsory. The course has limited enrollment for 22 students.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

120 h lab., including pre-lab lectures plus exercises. For laboratory period a personal time table will be created for every student. Each student will spent about 1 full day and 5 half day's slots in the lab, plus one week proteomics lab with workload from 2h to full day.

**Target group:**

Obligatory for M.Sc. in Protein Science and biotechnology

**Prerequisites and co-requisites:**

Protein production and analysis I (744635S) and Protein production and analysis II (744636S) OR Protein chemistry I (740364A)

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Four reports written in style of a scientific publication  
Read more about assessment criteria at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Ulrich Bergmann

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**743667S: Virology, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Thomas Kietzmann

**Opintokohteen kielet:** English

**Leikkaavuudet:**

740380A Virology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- discuss the major groups of viruses and their infection and replication mechanisms
- present and discuss characteristic features of specific viruses and their relation to pathogenesis and immunity
- describe diagnostic methods and antiviral therapy

**Contents:**

The course covers basic aspects of virology. The main emphasis will be made on viral infection, replication, transcription, proteinsynthesis, virological diagnostics, infection kinetics, defense against viruses, ways of infection, vaccination, and antiviral therapy. The course involves lectures 10h, 10h seminars, and reading literature with which the students should be able to recapitulate major aspects of the taught material in 5-7 min presentations.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures and student presentations in seminars

**Target group:**

Major students

**Prerequisites and co-requisites:**

Cellular biology

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Thomas Kietzmann

**Working life cooperation:**

No

**Other information:**

This module is the same as Virology (740385A). Location of instruction: Kontinkangas

**747614S: Macromolecular X-ray crystallography, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lari Lehtiö, Wierenga Rikkert

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747605S Basic aspects of protein crystallographic methods 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

After completion of this course students are able to:

- Discuss the key aspects of protein crystallization methods and interpret the results
- Describe the diffraction of X-rays and the importance of crystal symmetry
- Describe the importance of the Fourier transform method in the structure determination
- Describe the phase problem and tell the methods to solve it
- Apply knowledge on protein chemistry to refinement of a crystal structure
- Judge the quality of a protein structure

**Contents:**

The course will describe the principles of X-ray diffraction theory and practice. It includes a hands on project done throughout the course on protein crystallization, data collection, solving and refinement of the protein structure and validation of the model. Following topics will be covered during the lectures and practicals: crystallisation theory, symmetry of crystals, handling of crystals, data collection, diffraction pattern and the reciprocal lattice, the phase problem, molecular replacement, isomorphous and anomalous differences, structure refinement and validation. Attendance to the lectures and exercises is compulsory. The course has limited enrollment for 18 students

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

35 h lectures, 52 h exercises, project work and a research report

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

Protein chemistry I or Protein production and analysis or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

Rupp, B: Biomolecular Crystallography: Principles, Practice and Application to Structural Biology  
Blow, D: Outline of Crystallography for Biologists (eBook available)  
Drenth, J: Principles of Protein X-Ray Crystallography

**Assessment methods and criteria:**

Continuous assessment, research report, no exam.

**Grading:**

pass/fail

**Person responsible:**

Lari Lehtiö and Rikkert Wierenga

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**743666S: Introduction to immunology, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Zhi Chen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

740379A Introduction to immunology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc yr1-yr2 spring

**Learning outcomes:**

After the course students will be able to understand, identify, analyze and apply essential concepts of cellular and molecular components and mechanisms of immunology, and integrate their previous knowledge of molecular and cellular biology and protein chemistry with immunology and immunobiochemistry instances

**Contents:**

The course handles the basis of immunology, covering cells and mechanisms of innate and adaptive immune responses (inflammation, anti-microbial and anti-viral defenses, T-cell activation, antibody production, etc.). The course also offers insights into the physiopathology of the immune responses (chronic inflammation, allergy, autoimmune disorders, transplantation and cancer) and the clinical (immunotherapy, cytokine therapy, etc.) and industrial (monoclonal antibodies, ELISA and immunodiagnosics, etc.) applications of immunological processes.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (14 h), a written home exercise, and a final exam.

**Target group:**

Major and minor subject undergraduates

**Prerequisites and co-requisites:**

Preliminary required courses: Molekyylibiologia I, Protein chemistry I and Solun biologia, or equivalent basic molecular biology, protein chemistry and cell biology studies

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Home exercise, final exam



**Grading:**

1-5/fail

**Person responsible:**

Jane Chen

**Working life cooperation:**

No

**Other information:**

This module is the same as 740384A Introduction to immunology. Location of instruction: Kontinkangas campus.

**902154Y: Scientific Communication for Biochemists, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course

**Vastuuyksikkö:** Languages and Communication

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Susan McAnsh

**Opintokohteen kielet:** English

**Leikkaavuudet:**

902101Y English for Biochemists 2 3.0 op

**Proficiency level:**

[C1](#) on the CEFR scale

**Status:**

Optional but highly recommended for 4th-year students in BSc-MSc degree programme and for students in International MSc programmes (Protein Science and Biotechnology; Molecular Biology with a Double MSc Degree)

**Required proficiency level:**

A minimum level of B2 (CEFR) is needed at the start of the course.

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. year 1 spring term

**Learning outcomes:**

By the end of the course, students will have demonstrated an ability to

1. write a research article that follows the main discourse conventions of biochemistry,
2. prepare and deliver an oral, scientific conference or teaching presentation supported by an effective slideshow,
3. apply the rules of referencing,
4. use a sufficient range of appropriate academic vocabulary relevant to their discipline,
5. report their work orally or in writing with accuracy and in an appropriate academic style,
6. structure their work for optimal clarity and impact,
7. make good use of feedback from peers and teachers to improve their own scientific production.

**Contents:**

This course will cover presentation skills (2 ECTS credits) and scientific research writing (3 ECTS credits). The course aims to help students acquire understanding of the conventions and expectations of the academic community of biochemists for scientific reporting, and develop presentation and writing skills for their future professional life.

**Mode of delivery:**

Contact teaching (lessons/lectures and tutorials), web-supported independent study

**Learning activities and teaching methods:**

Writing module: Lectures 12 hours, independent work alone and in pairs 68 hours. Presentation Skills module: Lectures 4-6 hours, small-group tutorials 3-6 hours, independent work alone and in pairs 12-19 hours of independent work.

**Target group:**

Students in the first year of their Master's programme

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Course materials will be provided in electronic form by the teachers in the two online course workspaces: *Scientific writing for biochemists* and *Scientific presentation for biochemists*.

**Assessment methods and criteria:**

Assessment is based on the learning outcomes of the course, paying attention to regular completion and quality of course tasks, with particular emphasis on the final product of each part of the course: the final presentation and the final draft of a research article.

**Grading:**

pass/fail

**Person responsible:**

Suzy McAnsh and Kari-Pekka Kallunki.

**Working life cooperation:**

-

**Other information:**

Teaching will take place at the Kontinkangas campus.

**747613S: In silico methodologies in biochemistry and molecular medicine, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** André Juffer

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747603S Bioinformatics 2.5 op

747604S Introduction to biocomputing 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 autumn

**Learning outcomes:**

After a successful completion of this course, students will have

- Obtained an appreciation of the quantitative aspects of analyzing scientific (big) data either stored in large data databases or generated by sophisticated modeling and simulation tools.

- Gained a basic understanding of applying various bioinformatics methods to large biological data sets.
- Realized the potential of scientific computing for the study of the behavior of biological systems, in particular large biological macromolecules.

### Contents:

This course aims at emphasizing the quantitative aspects of scientific research. For this, the course contains three intertwined components: (i) searching and evaluating nucleic acid and protein structural data from various databases, (ii) use of scientific computing to study structural, dynamical, functional and thermodynamical properties of proteins and membranes and their interaction with other molecules, and (iii) using biocomputing tools to access and analyze large and high-throughput data produced and accessible through biochemical and computational experiments.

Students will learn to access biological databases, search and retrieve relevant data, analyze data in a meaningful manner, and link data and results obtained from different tools. A very brief introduction to metabases and data compilation is provided as well. Interaction studies are emphasized through genome-wide mapping of protein-DNA interaction, proteomics-based bioinformatics, and high-throughput mapping of protein-protein interaction networks. Commonly employed modeling and simulation techniques will also be dealt with. These include molecular dynamics, Monte Carlo and Langevin (stochastic, Brownian) dynamics, continuum electrostatics, statistical thermodynamics, protein modeling techniques, protein-ligand docking, protein-ligand affinity calculations and the computer simulation of the protein folding process and enzyme action.

### Mode of delivery:

Face to face teaching

### Learning activities and teaching methods:

74 h contact sessions. Lectures and practicals, student tasks, including the presentation of an original article. Attendance to practicals and article presentation are mandatory.

### Target group:

MSc / Protein science and biotechnology

### Prerequisites and co-requisites:

-

### Recommended optional programme components:

-

### Recommended or required reading:

Books, articles:

1. Big data in biomedicine (<http://www.nature.com/nature/outlook/big-data/>)
2. Holzinger, A. Biomedical informatics, Springer, Heidelberg, 2014.
3. PubMed (Publications) (<http://www.ncbi.nlm.nih.gov/pubmed/>)
4. Leach, A.R., Molecular modelling. Principles and applications, Second edition, Prentice Hall, New York, 2001
5. Berendsen, H.J.C Simulating the physical world. Hierarchical modeling from quantum mechanics to fluid dynamics., Cambridge University Press, Cambridge, 2007

Useful databases:

1. GenBank (DNA) (<http://www.ncbi.nlm.nih.gov/nucleotide>)
2. Ensembl and Ensembl Genomes (Genome) (<http://www.ensembl.org/> and <http://ensemblgenomes.org/>)
3. UniProt (Protein) (<http://www.uniprot.org/>)
4. DIP and BioGrid (Protein Interaction) (<http://dip.doe-mbi.ucla.edu/dip/Main.cgi> and <http://thebiogrid.org/>)
5. PDB (protein structure database) (<http://www.rcsb.org/>)
6. Entrez (<http://www.ncbi.nlm.nih.gov/gquery/gquery.fcgi>)

### Assessment methods and criteria:

Practicals evaluation, article presentation, group discussion, and project report. No exam.

### Grading:

pass/fail

### Person responsible:

André H. Juffer

### Working life cooperation:

no

**Other information:**

Location of instruction: Kontinkangas campus

**747615S: Introduction to structure-based drug discovery, 5 op**

**Voimassaolo:** 01.08.2016 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lari Lehtiö

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747612S Introduction to structure-based drug discovery 4.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

MSc yr1-2 spring

**Learning outcomes:**

After completion of this course student should be able to:

- Find and analyze a protein structure of interest from databases from the point of view of drug discovery
- Critically assess a quality of an experimental protein-small molecule complex structure
- Discuss the process of creating a virtual small molecule library
- Describe the commonly used computational methods for screening of small molecule libraries against a protein target
- Critically judge the results of the computational screening

**Contents:**

The course will consist of assignments, lectures and a project work carried out during the course in study groups. Groups will present their project plans and the results. All students will give feedback and share ideas during the discussions. The project carried out during the course will be supported by lectures and discussions. The final mark comprises marks from continuous assessment, active participation to the group work and oral exam. Attendance to some parts of the course is compulsory. The course has limited enrollment for 18 students.

**Mode of delivery:**

Face to face and web based teaching

**Learning activities and teaching methods:**

12 h Lectures, 48 h practicals and group work, 9 h student presentations and discussions

**Target group:**

MSc / Protein science and biotechnology

**Prerequisites and co-requisites:**

BSc in biochemistry or a related subject, Protein Chemistry I or Protein production and analysis

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment, presentations, oral exam

**Grading:**

1-5/fail

**Person responsible:**

Lari Lehtiö

**Working life cooperation:**

no

**Other information:**

Location of instruction: Kontinkangas campus

**744632S: Yeast genetics, 5 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Alexander Kastaniotis

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744623S Yeast genetics 6.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2 spring

**Learning outcomes:**

Upon successful completion students are able to:

- tell a basic knowledge of yeast genetics and physiology
- tell the basic principles of using the yeast model organism to address fundamental genetic and cell biological problems
- (practical course) describe variety of genetic and molecular biology techniques commonly used to manipulate baker's yeast in the pursuit of biological questions

**Contents:**

This course is an introduction to *Saccharomyces cerevisiae* as a model organism and the use of classical and molecular genetic approaches in this yeast to study basic cellular processes. We will also focus on genetic screens and selections designed to identify targets of interest. Aspects of transcriptional regulation will be discussed to provide a basic understanding for some of the screens and selections introduced. Performance in the course will be assessed by participation in the course review session at the beginning of each lecture (10% of total grade) and by a final written examination. The practical part of this is a block practical spread over two weeks (2 days – 3 days – 2 days – 3 days) running almost parallel to lecture course. It is designed to provide training in techniques and concepts commonly used in yeast genetics (streaking, spotting, mating, tetrad analysis, transformation, colony-color based assays, carbon source-dependent expression of genes, as well as generation and cloning of mutants). The course has limited enrollment for 16 people. It is also possible to only attend the lecture part of the course for 2.5 ECTS credits.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

14 h lectures, 10 days practical, final exam and oral participation in course review session

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Course review sessions, final exam, experiment reports Read more about [assessment criteria](#) at the University of Oulu webpage

**Grading:**

1-5/fail

**Person responsible:**

Alexander Kastaniotis

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus

**747617S: Biochemistry and biotechnology of protein folding, 5 op****Voimassaolo:** 01.08.2017 -**Opiskelumuoto:** Advanced Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Lloyd Ruddock**Opintokohteen kielet:** English**Leikkaavuudet:**

747611S Biochemistry of protein folding 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc., yr1-yr2 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- present and discuss issues presented in the primary literature on a variety of aspects of protein folding.
- display an understanding of the theoretical and practical implications of in vivo, in vitro and in silico studies on protein folding and the integration of results.
- demonstrate the ability to interpret a wide range of data from multiple sources, to critically evaluate and contextualize this data and to solve problems relating to interpretation.

**Contents:**

This module provides an introduction to protein folding in vivo and in vitro. Topics covered include protein folding and quality control in the endoplasmic reticulum, mechanisms regulating protein folding including the unfolded protein response, the catalysis of native disulphide bond formation, the biochemistry of molecular chaperones and the role of molecular chaperones and protein folding catalysts in other cellular events. The application of this knowledge to biotechnology will also be discussed.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

16 contact hours of lectures and seminars

**Target group:**

M.Sc. in Protein science and biotechnology and exchange students

**Prerequisites and co-requisites:**

Protein chemistry I (740364A) or Protein production and analysis (747618S) or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

The module is assessed based on reports prepared on individual topics and on participation in the seminars. Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas

**744631S: Dissertation, 15 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

744618S Dissertation 18.0 op

**ECTS Credits:**

15 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1-yr2

**Learning outcomes:**

Upon successful completion students are able to:

- apply information in the right context, integrate information from a wide range of sources and evaluate it critically
- communicate science in extensive written format and discuss and defend scientific arguments
- demonstrate independent work including self motivation, planning, organizational skills and time management.

**Contents:**

This module is based around the student producing an extensive, in-depth literature report in the style of a scientific review. Students are responsible for finding a suitable supervisor for their dissertation with whom they will discuss the scientific background and relevant literature. Students are strongly encouraged to meet with their supervisor weekly to discuss progress and ideas and to resolve problems. A one-page outline of the dissertation subject area, including details of the supervisor (who need not be from the

University of Oulu), must be approved by the module convener before starting this module. While the dissertation subject can be closely linked with the Pro Gradu project subject, students are advised that having distinct topics for these two modules will look better on their CV.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

400 hours of student work

**Target group:**

Major students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Written report

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

-

### **H325438: Optional courses available in Ulm - Molecular Medicine Double Degree, 30 - 60 op**

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.

### **H325432: Studies in biochemistry in other universities / abroad - MSc, 0 - 75 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Study module

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opintokohteen kielet:** Finnish

Ei opintojaksokuvauksia.



*Studies taken/planned to be taken outside of University of Oulu can be added to PSP only after they have been accepted and registered to Oodi. These studies will appear in "Other completed courses" -tab where these can be picked up and add to PSP. Students can estimate the amount of credits to be taken outside and include these into following codes.*

**746601S: Advanced studies in biochemistry in other universities, 0 - 75 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746605S: Advanced studies in biochemistry passed abroad, 0 - 75 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

**746609M: Studies in other universities/institutes, 0 - 50 op**

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Other Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Renata Prunskaitė-Hyyryläinen

**Opintokohteen kielet:** Finnish

**Voidaan suorittaa useasti:** Kyllä

Ei opintojaksokuvauksia.

## Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

**740148P: Biomolecules, 5 op**

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay740157P	Basic biochemistry 1: Biomolecules (OPEN UNI)	4.0 op
ay740152P	Basic biochemistry 1: Biomolecules (OPEN UNI)	5.0 op
740143P	Biomolecules for Biochemists	8.0 op
740147P	Biomolecules for Bioscientists	8.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English and Finnish

**Timing:**

autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell the composition, structure and function of the major groups of biomolecules in cells; nucleic acids, proteins, carbohydrates and lipids and describe the forces that modulate their function.
- apply information in the right context and evaluate it critically

**Contents:**

This module provides an overview of biochemistry, outlining the forces involved in biomolecule structure and the chemical structures and properties of polynucleic acids, proteins, carbohydrates and lipids. There will also be an introduction to prebiotic evolution and writing of a synopsis on this subject. The module is arranged into lectures or workshops, and writing the synopsis. All of the course materials are in English, but both English and Finnish are used in teaching. Both a final examination and continuous assessment will count towards the final mark.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

30 h lectures, plus exercises

**Target group:**

Minor subject students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Appling et al. Biochemistry – Concepts and Connections (2nd edition, 2019) Pearson Education Limited; ISBN 10: 1-292-26720-8, or equivalent

**Assessment methods and criteria:**

Continuous assessment, final examination

**Grading:**

1-5/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

This module is the same as Biomolecules for Biochemists except that it contains no practical component. Location of instruction: Linnanmaa campus

## 740147P: Biomolecules for Bioscientists, 8 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** English

**Leikkaavuudet:**

ay740157P	Basic biochemistry 1: Biomolecules (OPEN UNI)	4.0 op
ay740152P	Basic biochemistry 1: Biomolecules (OPEN UNI)	5.0 op
740143P	Biomolecules for Biochemists	8.0 op
740148P	Biomolecules	5.0 op

**ECTS Credits:**

8 credits

**Language of instruction:**

English and Finnish

**Timing:**

Course starts in autumn term and will continue to spring term

**Learning outcomes:**

Upon successful completion students are able to:

- tell the composition, structure and function of the major groups of biomolecules in cells; nucleic acids, proteins, carbohydrates and lipids and describe the forces that modulate their function.
- apply information in the right context and evaluate it critically
- In addition, students on the 8op versions are able to work in the biochemical laboratory, are able to solve calculations and problems and are able to interpret the scientific data they generate

**Contents:**

This module provides an overview of biochemistry, outlining the forces involved in biomolecule structure and the chemical structures and properties of polynucleic acids, proteins, carbohydrates and lipids. There will also be an introduction to prebiotic evolution and writing of a synopsis on this subject. The module is arranged into lectures or workshops, computing and other exercises and laboratory work. All of the course materials are in English, but both English and Finnish are used in teaching. Both a final examination and continuous assessment will count towards the final mark and attendance of some parts is compulsory.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

30 h lectures, 32 h lab., plus exercises

**Target group:**

Minor subject students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Mathews, van Holde & Ahern: Biochemistry, (3rd edition), published by Addison Wesley Longman, Inc. or equivalent

**Assessment methods and criteria:**

Continuous assessment, final examination

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

This module is the same as Biomolecules for Biochemists. Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

**724108P: Financial Markets, 5 op**

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Business School

Arvostelu: 1 - 5, pass, fail

Opettajat: Mirjam Lehenkari

Opintokohteen kielet: Finnish

**Leikkaavuudet:**

ay724108P Financial Markets (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4 (1. year)

**Learning outcomes:**

The course is an introduction to the role and functions of financial markets and institutions. Upon successful completion of the course, the student will be able to describe the basic structure and operational principles of financial markets and to identify different types of financial instruments and their characteristics.

**Contents:**

1) the role of financial markets and institutions in the economy, 2) main types of financial assets, their properties, and basics of pricing, 3) stock markets, bond markets, derivative markets, mutual funds, private equity

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

Lectures (26 h), visiting lectures (10 h), self-study (94 h), exam (3h)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

Kallunki, Martikainen & Niemelä: Ammattimainen sijoittaminen (8th edition), Alma Talent; Pilbeam: Finance & Financial Markets (3rd edition), Palgrave Macmillan; other material announced during the lectures

**Assessment methods and criteria:**

Examination, lecture diaries

E-exam Examinariudessa

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Mirjam Lehenkari

**Working life cooperation:**

General knowledge of the functions of financial markets and the various market participants

**Other information:**

The number of students is limited.

**724111P: Finnish Economy and Economic Policy, 5 op****Voimassaolo:** 01.08.2014 -**Opiskelumuoto:** Basic Studies**Laji:** Course**Vastuuyksikkö:** Oulu Business School**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Jaakko Simonen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

ay724111P Finnish Economy and Economic Policy (OPEN UNI) 5.0 op

**Voidaan suorittaa useasti:** Kyllä**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 4 (1st year).

**Learning outcomes:**

After the course the student is capable of outlining the economic history of Finland, to describe the position of Finland in the global economy and to evaluate the challenges of the Finnish economy now and the future. In addition, the student can describe the main features of the different areas in the Finnish economy.

**Contents:**

The course provides an overview of the Finnish economy and economic history, its current state and future development. The course deals with the activities of the Finnish economy and development, such as globalization, regional economy and general economic policy.

Lectures will include the following themes

1. The long term development of Finnish economy
2. Productivity and economic growth
3. Globalisation and Finland
4. Public economics and challenges of welfare state
5. Regional development and regional policy in Finland
6. Labour markets and labour mobility

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

32 h lectures, reading the course literature (98 h) and exam (3 h).

**Target group:**

Major students in economics and business administration

**Recommended optional programme components:**

The course is part of Analytical skills -module.

**Recommended or required reading:**

Announced by the lecturer

**Assessment methods and criteria:**

Lecture- and literature examination

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Jaakko Simonen

**Working life cooperation:**

Students are familiar with the central features of the Finnish economy and are able to assess their impact on daily activities of the state, municipalities, firms and citizens.

**Other information:**

The number of students is limited.

## 724110P: Introductory Economics, 5 op

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Marko Korhonen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay724110P	Introductory Economics (OPEN UNI)	5.0 op
721211P	Principles of Economics	10.0 op
721210P	Principles of Economics	5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 1 (1st year)

**Learning outcomes:**

After completing the course students (i) understand the basic concepts of economics and the rudiments of economic theory, (ii) can explain the determination of resource allocation and prices in a market economy, (iii) know how the aggregate economy operates in the short and long run, and (iv) how economic policy affects the economy.

**Contents:**

The course introduces students to the tools and ideas economics uses to describe and explain economic phenomena. The topics include:

- basic ideas and principles of economics
- opportunity cost and comparative advantage
- market equilibrium: demand and supply
- how well does market economy work?
- firms and competition in market economy
- aggregate economic activity and its measurement
- business cycles
- economic growth

**Mode of delivery:**

Face-to-face teaching

**Learning activities and teaching methods:**

36 lectures including possible problem sets. Students are expected to do the problem sets on their own and familiarize themselves with the required and recommended materials (93 h). Mid-term exams or Final Exam

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

Material posted at the webpage. Textbook:

Acemoglu, D., Laibson D. and List, J.A., Economics, 2018 ja oheislukemisto: Timothy Taylor, The Instant Economist. Everything You Need to Know About How the Economy Works. 2012. A Plume Book (Penguin), New York NY. Robert P. Murphy, Lessons for the Young Economist. Ludvig von Mises Institute 2010; [http://mises.org/books/lessons\\_for\\_the\\_young\\_economist\\_murphy.pdf](http://mises.org/books/lessons_for_the_young_economist_murphy.pdf)

**Assessment methods and criteria:**

Mid-term exams or Final exam

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Marko Korhonen

**Working life cooperation:**

Students learn relevant and useful facts about the operation of the markets, and the aggregate economy to an extent that they can reasonably utilize those facts and knowledge in the decision making of the business they are working at.

**Other information:**

The number of students is limited.

**724105P: Management Accounting, 5 op**

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Oulu Business School

Arvostelu: 1 - 5, pass, fail

**Opettajat:** Marjo Väisänen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay724105P Management Accounting (OPEN UNI) 5.0 op

721172P Management Accounting 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

English (course is lectured separately in Finnish and in English).

**Timing:**

Period 1 (2<sup>nd</sup> year)

**Learning outcomes:**

After passing the course, the student knows the basic cost concepts and the elements of cost accounting systems. Students are also able to apply the basic cost information in the company's decision making and explain which costs should be included in these calculations under different circumstances.

**Contents:**

Theoretical framework for understanding cost accounting, cost concepts, cost recording, different product costing methods, cost-volume-profit analysis, using cost accounting information in decision making.

**Mode of delivery:**

Face-to-face teaching.

**Learning activities and teaching methods:**

20 h lectures, 14 h exercises and independent reading of study materials and doing assignments (99 hours).

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

**Recommended optional programme components:**

This course is part of "Business Processes" -module

**Recommended or required reading:**

[Drury, C.: Management and cost accounting, 7th or 8th ed. Cengage Learning EMEA. Chapters 1-11 \(8th ed.\); Supplementary material: Järvenpää, M.- Lämsiluoto, A - Partanen, V. – Pellinen, J.: Talousohjaus ja kustannuslaskenta, WSOYpro, chapters 1-8](#)

**Assessment methods and criteria:**

Lectures and literature examination.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Marjo Väisänen

**Working life cooperation:**

Understanding of management accounting systems is typically an important part of work for graduates in economics and business administration and an essential part of occupations like management accountant or controller.

**Other information:**

The number of students is limited.

## 724102P: Management and Organizations, 5 op

**Voimassaolo:** 01.08.2014 -

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Oulu Business School

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Anna-Liisa Kaasila-Pakanen

**Opintokohteen kielet:** Finnish

**Leikkaavuudet:**

ay724102P Management and Organizations (OPEN UNI) 5.0 op  
721511P Foundations of Management 5.0 op

**Voidaan suorittaa useasti:** Kyllä

**ECTS Credits:**

5 credits

**Language of instruction:**

Finnish

**Timing:**

Period 1 (1st year).

**Learning outcomes:**

Upon completion of the course, the student will be able to adopt the basic concepts related to organisation, organising, management as well as managerial work. The student understands what leadership and management means in practice and learns the skills that are needed in analyzing and managing organisations' activities. The student can define principles of different management styles and is able to understand various ongoing functions within organisations and the challenges they set for the management of the organisation.

**Contents:**

The course provides conceptual and concrete tools for understanding activities and management of organisations. In the course we reflect the key questions of organisations and management; including organisations' success factors and the practices of management and leadership, both from the leader's and worker's point of view. During the course the students familiarize themselves with the scientific development path of organisations and management through gaining knowledge of different management styles as well as the ways these styles affect the functions of organisations in different business environments.

**Mode of delivery:**

Lectures, visiting lecturers, case-practices and group work

**Learning activities and teaching methods:**

Lectures (36 hours), reading the course material (45 hours), preparation for the exam (52 hours)

**Target group:**

Major students in economics and business administration

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

This course is part of "Introduction to business studies" -module

**Recommended or required reading:**

[Gareth Morgan \(1997 or newer\). Images of organization. London: Sage Publications.](#)

[Hannele Seeck \(2012 or newer\). Johtamisopit Suomessa. Helsinki: Gaudeamus.](#)

Lecture material

**Assessment methods and criteria:**

Written exam of lectures and literature counts for 60 % of the course grade. 40 % of the course grade is constituted by group work. Attendance in visiting lectures is 100%.

**Grading:**

The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.

**Person responsible:**

Anna-Liisa Kaasila-Pakanen

**Working life cooperation:**

Applying learned issues to practical situations in different organisations and business environments. A down-to-earth understanding of modern organisations' success factors and practices of management and leadership.

**Other information:**

The number of students is limited.

## 740149P: Metabolism I, 4 op

**Opiskelumuoto:** Basic Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Tuomo Glumoff

**Opintokohteen kielet:** Finnish



**Leikkaavuudet:**

ay740158P	Basic biochemistry 3: Metabolis (OPEN UNI)	4.0 op
ay740154P	Basic biochemistry 3: Metabolis (OPEN UNI)	3.0 op
740146P	Metabolism I	6.0 op

**ECTS Credits:**

4 credits

**Language of instruction:**

Finnish

**Timing:**

spring

**Learning outcomes:**

Students will be able to explain the main principles of how the metabolism is made up, will get a detailed picture of the energy metabolism, and will be able to organize part of the wholeness of metabolism, particularly how energy metabolism is networked to the synthesis and degradation of biomolecules.

**Contents:**

On this course the central concepts and mechanisms of metabolism, its regulation and the integration of metabolic pathways will be introduced, like anabolism and catabolism, linking of different pathways, and metabolic regulation. Especially the energy metabolism will be studied, concerning carbohydrates, lipids and the respiratory chain. Combined with the course Metabolism II the students will get a good overview on the principles of metabolism, metabolic integration and the methods to study metabolism.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

Lectures (28 h), problem-based exercises and final exam.

**Target group:**

Minor subject students

**Prerequisites and co-requisites:**

Biomolecules for Biochemists or Biomolecules for Bioscientists or Biomolecules

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Problem-based exercises and a final exam will count towards the final grade.

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail.

**Person responsible:**

Tuomo Glumoff

**Working life cooperation:**

No

**Other information:**

This module is the same as Metabolism I (740146P), except that it contains no laboratory component.

**Location of instruction:** Linnanmaa**740374A: Microbiology, 3 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Pospiech, Helmut**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

740363A	Microbiology	6.0 op
740322A	Microbiology	3.0 op

**ECTS Credits:**

3 credits

**Language of instruction:**

English

**Timing:**

spring

**Learning outcomes:****Learning outcomes:** Upon successful completion students are able to:

- define the typical features of bacteria, archaea, fungi and virus and explain the diversity of different groups of microorganisms
- explain the basic aspects of microbial metabolism
- understand the basics of microbial growth, enrichment, culture and growth control both in the environment and in contained culture
- explain the essential roles of microorganisms in our environment
- apply their knowledge for the growth and its control of standard laboratory microorganisms
- have a basic understanding of the industrial use of microorganisms or microbial compounds.

**Contents:**

This module is an introduction to general and applied microbiology and consists of lecture and laboratory exercises. In the lectures, the diversity and classification of micro organisms, especially bacteria will be introduced. Further topics are the structure and function of the prokaryotic cell, bacterial growth, metabolism and physiology, the importance of bacteria in different ecosystems as well as the industrial use of bacteria.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

24 h lectures

**Target group:**

Minor subject students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

M. Salkinoja-Salonen (toim.) (2002) Mikrobiologian perusteita, Helsingin yliopisto; M.T. Madigan, J. M. Martinko, J. Parker (2010) Brock biology of microorganisms, 13th ed. Prentice Hall International.

**Assessment methods and criteria:**

Continuous assessment (home works), final exam

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

1-5/fail

**Person responsible:**

Helmut Pospiech

**Working life cooperation:**

No

**Other information:**

This module is the same as Microbiology (740363A) except that it contains no practical component. Location of instruction: Linnanmaa campus

**740373A: Molecular Biology I, 4 op****Opiskelumuoto:** Intermediate Studies**Laji:** Course**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine**Arvostelu:** 1 - 5, pass, fail**Opettajat:** Mirva Saaranen**Opintokohteen kielet:** Finnish**Leikkaavuudet:**

740361A Molecular Biology I 8.0 op

740318A Molecular Biology 4.0 op

**ECTS Credits:**

4 credits

**Language of instruction:**

Finnish

**Timing:**

autumn

**Learning outcomes:**

After this course students should understand modern molecular biology methods.

**Contents:**

The course covers gene structure, DNA replication, recombination, transcription and translation. The student will learn the most common recombinant DNA techniques, such as PCR, use of restriction endonucleases, preparation of recombinant plasmids and DNA sequencing.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

20 h lectures, 4 h computer exercise and homeworks

**Target group:**

Minor subject students

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

Mathews, CK, van Holde KT, Applins DR, Anthony-Cahill SJ: Biochemistry (4th edition). Optional.

**Assessment methods and criteria:**

Homeworks 50%, final exam 50%

Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail.

**Person responsible:**

Mirva Saaranen and Henrika Honkanen

**Working life cooperation:**

no

**Other information:**

This course is the same as Molecular biology I (740361A) but without practical part.

**Location of instruction:** Linnanmaa

**746606S: Project work in Biochemistry, 1,5 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**ECTS Credits:**

1,5 credits

**Language of instruction:**

English

**Learning outcomes:**

Upon successful completion students are able to:

- apply scientific knowledge and methods to undertake scientific research with supervision

**Contents:**

Research work done in the Faculty of Biochemistry and Molecular Medicine or elsewhere which is not compensated in other courses. 40 hours of work gives 1.5 ECTS. The project work must be accepted beforehand and a report must be written and approved.

**Mode of delivery:**

Face to face teaching

**Target group:**

This module is meant for exchange students only

**Prerequisites and co-requisites:**

-

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Research work in the lab

Read more about [assessment criteria](#) at the University of Oulu webpage.**Grading:**

pass/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

Yes

**Other information:**

-

**744626S: Protein chemistry II, 5 op**

Voimassaolo: 01.08.2017 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Lari Lehtiö

Opintokohteen kielet: English

**Leikkaavuudet:**

744620S Protein chemistry II 3.0 op

747606S Structural enzymology 3.0 op

**ECTS Credits:**

5 credits

**Language of instruction:**

English

**Timing:**

M.Sc. yr1 autumn

**Learning outcomes:**

After completion of this course students are able to:

- Discuss professional literature dealing with advanced techniques of protein analysis
- Plan the expression, purification and characterization of a given protein
- Present and analyze work related to protein purification and analysis
- Describe enzyme reaction mechanisms and the meaning of Michaelis-Menten kinetic constants
- Define the relation between reaction rates and free energy barriers
- Describe the basic concepts of the transition state theory
- Tell the importance of active site electrostatics and dynamics

**Contents:**

The course provides a "real-life" problem-based approach to practical protein chemistry, including purification, biophysical analysis, kinetics and protein structures. It comprises a small number of revision lectures and advanced lectures on structural enzymology. The course contains problem solving based exercises with a further level of complexity built in compared with Protein Chemistry I. The course includes a student presentation, home work and a student report in the form of a research plan, but does not include a final examination. Attendance to the seminars is compulsory.

**Mode of delivery:**

Face to face teaching and home exercises

**Learning activities and teaching methods:**

32 hr Lectures and seminars, plus exercises and writing of a research plan

**Target group:**

Major students

**Prerequisites and co-requisites:**

Protein Chemistry I or Protein production and analysis or equivalent

**Recommended optional programme components:**

-

**Recommended or required reading:**

Alan Fersht, Structure and Mechanism in Protein Science; <http://www.fersht.com/Structure.html>

**Assessment methods and criteria:**

Continuous assessment, presentations, research plan

**Grading:**

1-5/fail

**Person responsible:**

Lari Lehtiö

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas. For study year 2020-21 course will be replaced by 744635S Protein production and analysis I

## 747618S: Protein production and analysis, 10 op

**Voimassaolo:** 01.08.2017 -

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuyksikkö:** Faculty of Biochemistry and Molecular Medicine

**Arvostelu:** 1 - 5, pass, fail

**Opettajat:** Lloyd Ruddock

**Opintokohteen kielet:** English

**Leikkaavuudet:**

747601S Protein production and analysis 8.0 op

**ECTS Credits:**

10 credits

**Language of instruction:**

English

**Timing:**

Int M.Sc. yr1 autumn

**Learning outcomes:**

Upon successful completion students are able to:

- tell and discuss the relevance of protein structure, including post-translational modification, to protein function
- assess the techniques available to purify proteins and to study protein function and an appreciation of the applications and limitations of these techniques
- interpret a wide range of biochemical data and to solve problems relating to the interpretation of data relating to protein function and basic structural characterization

**Contents:**

This module provides an overview of recombinant protein production and analysis. Topics covered include an overview of DNA technology, PCR, cloning, mutagenesis, protein production, purification, enzyme catalysis, protein structure analysis, and protein folding. This course covers some of the material taught in Protein Chemistry I (740364A) and Molekyylibiologia I (740361A) and therefore cannot be taken by students who have either of these modules.

**Mode of delivery:**

Face to face teaching

**Learning activities and teaching methods:**

56 contact hours of lectures and seminars, 3 assignments, 80 hours of lab

**Target group:**

Int MSc in Prot Sci and exchange students

**Prerequisites and co-requisites:**

A BSc in biochemistry or a closely related subject.

**Recommended optional programme components:**

-

**Recommended or required reading:**

-

**Assessment methods and criteria:**

Continuous assessment (problem solving exercises, lab reports) Read more about [assessment criteria](#) at the University of Oulu webpage.

**Grading:**

1-5/fail

**Person responsible:**

Lloyd Ruddock

**Working life cooperation:**

No

**Other information:**

Location of instruction: Kontinkangas campus. For study year 2020-21 course will be replaced by 744635S Protein production and analysis I (5 credits) 744636S and Protein production and analysis II (5 credits)