Opasraportti

FBMM - Courses in English for exchange students, Biochemistry (2019 - 2020)

Courses in English for exchange students at the Faculty of Biochemistry and Molecular Medicine

This Course Catalogue lists **Courses** (tab above) taught in English that are available for exchange students at the Faculty of Biochemistry and Molecular Medicine during academic year 2019-20.

Individual course codes include information on the level of course.
xxxxxP, xxxxxY = basic, introductory level courses
xxxxxA = for 2-3 year students, Bachelor level courses
xxxxxS = for 4-5 year students, Master level courses

When preparing your study plan please use the information provided under the Courses tab in this catalogue. Read carefully the information of each course you wish to take: language of instruction, target group, course content, timing (AUTUMN OR SPRING TERM), preceding studies, additional information containing LOCATION OF INSTRUCTION (Kontinkangas campus / Linnanmaa campus).

The first year and the autumn term of the second year biochemistry courses (lecture parts) of the studies for BSc Degree will be taught at the LINNANMAA CAMPUS, with the remaining education and all laboratory parts provided at the KONTINKANGAS CAMPUS.

Please notice that in some courses lectures will be given in Finnish but laboratory part is possible to take in English (Biochemical methodologies I, Molecular biology I, Metabolism I).

Please notice that in some courses the number of students is restricted (see "Additonal data in the course cataloque FBMM..."). In these courses degree students have the privilege and possibility for exchange students to participate will be decided only some weeks before a course will start.

For information on the exchange application process please see www.oulu.fi/university/studentexchange. All exchange applicants must submit their exchange application through SoleMOVE by the deadline given, proposed study plan is attached to the on-line application.

Accepted exchange students are required to register to all courses. Course registration takes place once you have received your University of Oulu login information, this takes place close to the start of your exchange period. When registering you will be able to find detailed information on teaching and schedule under Instruction tab.

In order to participate courses You should have enough backgound knowledge (especially for laboratory parts).

If You are going to have internship period in research laboratory please contact directly group leaders in the faculty and ask a position (http://www.oulu.fi/fbmm/). You will be given 1.5 ECTS credits for each full week (40 hr) in the laboratory (see 746606S Project work in biochemistry). For example 10 full weeks in a research work gives You 15 ECTS.

Teaching periods for 2019-20
Autumn term 2019
Period 1: Sept 2 - Oct 25, 2019

Period 2: Oct 28 – Dec 20, 2019

Spring term 2020
Period 3: Jan 7 – March 6, 2020
Period 4: March 9 – May 8, 2020 (some biochemistry courses will continue to May 31, 2020)

For arrival and orientation dates see www.oulu.fi/university/studentexchange/academic-calender

Any questions on courses at the Faculty of Biochemistry and Molecular Medicine

should be addressed to:

Jari Heikkinen
study.fbmm(at)oulu.fi

Further information on application process and services for incoming exchange students:
www.oulu.fi/university/studentexchange or international.office(at)oulu.fi

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

740381A: Biochemical and biomedical innovation, 2 - 5 op
740151P: Biochemical methodologies I, 10 op
747616S: Biochemical methodologies II, 10 op
747617S: Biochemistry and biotechnology of protein folding, 5 op
740148P: Biomolecules, 5 op
740147P: Biomolecules for Bioscientists, 8 op
740362A: Cellular Biology, 6 op
740366A: Cellular Communication, 6 op
743663S: Developmental biology, stem cells and tissue engineering, 5 op
743662S: Extracellular matrix, 5 op
743664S: Hypoxia response pathway - molecular mechanisms and medical applications, 5 op
747613S: In silico methodologies in biochemistry and molecular medicine, 5 op
740384A: Introduction to immunology, 5 op
747615S: Introduction to structure-based drug discovery, 5 op
747614S: Macromolecular X-ray crystallography, 5 op
740146P: Metabolism I, 6 op
740363A: Microbiology, 6 op
740374A: Microbiology, 3 op
740361A: Molecular Biology I, 8 op
744627S: Molecular biology II, 5 op
743665S: Molecular, cell biological and genetic aspects of diseases, 5 op
740145P: Physical Biochemistry, 6 op
740386A: Physiological biochemistry, 5 op
746606S: Project work in Biochemistry, 1,5 op
740364A: Protein Chemistry I, 8 op
744626S: Protein chemistry II, 5 op
747618S: Protein production and analysis, 10 op
744630S: Systems biology, 5 op
743668S: Tumor cell biology, 5 op
740385A: Virology, 5 op
744632S: Yeast genetics, 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

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

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:
Finnish
Timing:
B.Sc. yr1 autumn (lectures), yr1 spring (laboratory practicals)
Learning outcomes:
Upon succesful 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, extraction of lipids from nutmeg, 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

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 autumn
Learning outcomes:
Upon successful completion students are able to:

- describe the theoretical basis of the main biochemical analysis methods for proteins
- identify and 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 fluorescence spectroscopy, stopped flow analysis of enzymatic reactions, circular dichroism, surface plasmon resonance, micro-calorimetry, mass spectrometry, and proteomics based on 2D electrophoresis.For assessement each student has to write a research report 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 (747618S) or Protein chemistry I (740364A)
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Report 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 spring
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

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 lipds 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 a student debate on this subject. The module is arranged into lectures or workshops. All of the exercises 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, plus exercises
Target group:
Minor subject students, exchange 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:
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 lipds 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 a student debate on this subject. The module is arranged into lectures or workshops, a student debate, computing 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, 48 h lab., plus exercises
Target group:
Minor subject students, exchange 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:
This module is the same as Biomolecules for Biochemists. Location of instruction: Lectures: Linnanmaa, laboratory: 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:
Finnish
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

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: Vainio Seppo, Aleksandra Rak-Raszewska

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

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 2018: 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
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

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

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 spring
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. Hierarchial 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

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 immunodiagnostics, 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.

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 20 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

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

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:
Finnish
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:
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

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 explane 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

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 explane 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

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:
Finnish and 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 Aki Manninen
Working life cooperation:
No
Other information:
Location of instruction: Lectures: Linnanmaa, laboratory: Kontinkangas

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:

- discuss the general features of DNA manipulating/amplifying enzymes
- design (on paper or in silico) oligonucleotides for PCR amplification, set up restriction digests and ligation reactions in order to carry out basic and advanced cloning procedures
- use basic tools used in the genetic manipulation of mice

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, but it is primarily based on complex problem solving based exercises including written reports and group student presentations, but does not include a final examination. The final mark comprises marks from continuous assessment. 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 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:
Written report, student presentation. No exam.
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

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

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 thermodynam-ics: 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

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. yr3 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:
Alternative course: 751323A Animal physiology 5 op
Recommended or required reading:
Murray et al. Harpers' Illustrated Biochemistry (29 th edition)
Assessment methods and criteria:
Home work and final exam
Grading:
1-5/fail
Person responsible:
Kalervo Hiltunen
Working life cooperation:
No
Other information:
Recommended optional course. Location of instruction: Kontinkangas

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:
-

740364A: Protein Chemistry I, 8 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Martti Koski

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, exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5/fail
Person responsible:
Kristian Koski
Working life cooperation:
No
Other information:
Location of instruction: Lectures at Linnanmaa campus, laboratory exercises at Kontinkangas campus.

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
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

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 biochemisty 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

744630S: Systems 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: Gonghong Wei

Opintokohteen kielet: English

Leikkaavuudet:

744619S Systems biology 4.0 op

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
M.Sc. 1st-2nd spring
Learning outcomes:
After the course student is able to define the cell as an ensemble of structural and functional parts. He is also able to connect and describe their current knowledge on cellular, molecular and structural biology into a general view. The student is also able to assess scientific information critically on novel research findings and the problems associated with massive amounts of novel scientific information.
Contents:
The module aims to give a holistic picture of the cell as a system. Cells contain numerous molecules and complex structures that interact with each other to form complex interaction networks such that when taken together they form a new whole, which cannot be understood by just investigating the parts. Methods to collect and assemble biological/biochemical information for systems analysis will be introduced. Possibilities of systems approach will be critically discussed in relation to available research techniques, techniques of the future, applications, research targets, as well as from the philosophical and ethical point of view including applicability of the systems theory in biosciences.
Mode of delivery:
Face to face teaching
Learning activities and teaching methods:
The module consists of 22 h of lectures, discussions and case studies, ca. 5h of computing exercises
Target group:
Major students
Prerequisites and co-requisites:
B.Sc. in biochemistry or a related subject or otherwise adequate knowledge on cellular, molecular and structural biology.
Recommended optional programme components:
-
Recommended or required reading:
-
Assessment methods and criteria:
Study diaries will be assessed for a mark on scale 1 to 5 upon request. Otherwise marking will be Pass/fail. There is no exam and thus presence on certain amount of the course is compulsory. Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5/fail
Person responsible:
Gonghong Wei
Working life cooperation:
No
Other information:
Location of instruction: Kontinkangas campus

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, desribe 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 teached 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

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 immuni-ty
• 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 teached 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

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.

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