Opasraportti

LTK - Medical and Wellness Technology (2013 - 2014)

THE DEGREE PROGRAMMES OF MEDICAL AND WELLNESS TECHNOLOGY 2013 - 2014

The education is based on Regulation of Health Sciences degree (794/2004) and it will lead to the qualification of Bachelor in Health Science and Master in Health Science majoring in Medical and Wellness Technology. The degree programmes are based on studies in technology, science and biomedicine. During the studies students achieve the required basic knowledge and skills through both theoretical and practical exercises.

The degree programme of Bachelor in Health Science (180 credits) can be completed in three years, studying full-time. Studies include compulsory general, basic and intermediate studies and optional studies. In addition to compulsory and optional studies the student completes Bachelor's Thesis and Maturity
Test.

The Master's degree in Health Science (120 credits) will be completed after the Bachelor's degree. The full degree can be completed in two years, studying full-time. Studies include compulsory intermediate and advanced studies, advanced module's studies and optional studies. In addition to these studies the student completes Master's Thesis.

There are three different advanced modules in Master's degree programme:

- Biomedical Technology
- Medical Imaging
- Health Technology

The graduated can operate as an expert in different fields including education, research and with tasks involved with industry and health care. The Master's degree gives a competence and good multidisciplinary basis to the postgraduate doctoral degree education.

Bachelor's Degree Programme in Medical Technology -180 ETCS

ADMISSION REQUIREMENTS

General admission requirement is completed Finnish Matriculation Examination or equivalent proof of completing upper secondary school. Applicants with IB, EB, or Reifprüfung degree will be considered the same as the applicants with Finnish Matriculation Examination.

A student who has not completed the matriculation examination can be accepted, if he or she has graduated from a polytechnic, college or higher level vocational education institution or has at least three years of vocational education, or if he or she has received such an education abroad that makes him or her eligible for university studies in the country in question. Equivalent foreign education also gives general eligibility for degree programme in Medical and Wellness Technology. Foreign applicant's admission is based exclusively on the results of the entrance examination.

All applicants to the degree programme in Medical and Wellness Technology have to attend an entrance examination, which includes Chemistry and Physics. Applicants are expected to have sufficient knowledge in mathematics, chemistry and physics. A comparative index is calculated for each applicant based on their Matriculation Examination. Selection is done in two parts. Students can be selected by using either the comparative index and the result of Entrance Examination or only the result of Entrance Examination. The language of entrance examination is Finnish.

Instructions in Finnish can be found on the web page: http://www.medicine.oulu.fi/opiskelijavalinta.html

STUDIES IN BACHELOR'S DEGREE PROGRAMME

Studies include compulsory general, basic and intermediate studies and optional studies so that the total extent of the degree is at least 120 credits. Studies are recommended to be performed according to the attached indicative timetable. The letter Y at the end of the course code refers to general studies, the letter P to basic studies and the letter A to intermediate studies.

General Studies 11 ECTS

040007Y Introduction to scientific research 1.5 ECTS
040011Y Medical informatics I and II 1.5 ECTS
580101Y Introduction to University Studies 2 ECTS
901020Y Swedish 3 ECTS
902006Y Reading for Academic Purposes 1.5 ECTS
902007Y Scientific Communication 1.5 ECTS

Basic Studies 79 ECTS

031010P Calculus I 5 ECTS
031011P Calculus II 6 ECTS
031017P Differential Equations 4 ECTS
031019P Matrix Algebra 3.5 ECTS
040002Y Medical cell and developmental biology 7 ECTS

040005Y Biostatistics 3 ECTS

040105Y Basic Epidemiology 1.5 ECTS
040901Y Basic Anatomy 2 ECTS

040902Y Medical Biochemistry and Molecular Biology 9 ECTS
050004Y Chemistry 3 ECTS
521141P Elementary Programming 5 ECTS
555280P Basic Course of Project Management 2 ECTS
580102P Introduction to Medical and Wellbeing Technology 3 ECTS
761101P Basic Mechanics 4 ECTS
761102P Basic Thermodynamics 2 ECTS

761103P Electricity and Magnetism 4 ECTS
761104P Wave Motion 3 ECTS

761105P Atomic and Nuclear Physics 3 ECTS
761116P Radiation Physics, Biology and Safety 3 ECTS
761121P Laboratory exercises in physics I 3 ECTS

764163P Introduction to biophysics 3 ECTS

Intermediate Studies 68.5 ECTS
031050A Signal analysis 4 ECTS

040108A General Pathology 3.5 ECTS

040112A Physiology 15 ECTS

041201A Basics in eHealth 5 ECTS
080901A Introduction to Technology in Clinical Medicine 6 ECTS
521109A Electrical Measurement Principles 5 ECTS
521142A Embedded Systems Programming 5 ECTS
521302A Circuit Theory 1 5 ECTS

521337A Digital Filters 5 ECTS
521431A Principles of Electronics Design 5 ECTS

764324A Biophysical Laboratory Exercises I 5 ECTS

764627A Virtual Measurement Environments 5 ECTS

Bachelor's Thesis and Maturity Test 10 ECTS
580209A Bachelor's Thesis 10 ECTS
580211A Maturity Test 0 ECTS

Bachelor's Degree Programme in Medical Technology, studies for each semester

1. Academic year

031010P Calculus I 5 ECTS
031019P Matrix Algebra 3.5 ECTS
040011Y Medical informatics I 0.5 ECTS
521141P Elementary Programming 5 ECTS
580101Y Introduction to University Studies 2 ECTS
580102P Introduction to Medical and Wellbeing Technology 3 ECTS
761101P Basic Mechanics 4 ECTS
761102P Basic Thermodynamics 2 ECTS
761121P Laboratory exercises in physics I 3 ECTS
902007Y Scientific Communication 1.5 ECTS

031011P Calculus II 6 ECTS

031017P Differential Equations 4 ECTS
040007Y Introduction to scientific research 1.5 ECTS
040011Y Medical informatics II 1 ECTS
040901Y Basic Anatomy 2 ECTS
521142A Embedded Systems Programming 5 ECTS
761104P Wave Motion 3 ECTS

761103P Electricity and Magnetism 4 ECTS
764163P Introduction to biophysics 3 ECTS
902006Y Reading for Academic Purposes 1.5 ECTS

In total 60.5 ECTS

2. Academic year

040002Y Medical cell and developmental biology 7 ECTS
080901A Introduction to Technology in Clinical Medicine 6 ECTS
521302A Circuit Theory 1 5 ECTS

521109A Electrical Measurement Principles 5 ECTS

761105P Atomic and Nuclear Physics 3 ECTS
764324A Biophysical Laboratory Exercises I 5 ECTS
901020Y Swedish 3 ECTS (is held every second year)

040005Y Biostatistics 3 ECTS

040902Y Medical Biochemistry and Molecular Biology 9 ECTS

041201A Basics in eHealth 5 ECTS
050004Y Chemistry 3 ECTS

521431A Principles of Electronics Design 5 ECTS
761116P Radiation Physics, Biology and Safety 3 ECTS

In total 59 or 62 ECTS

3. Academic year

031050A Signal analysis 4 ECTS

040108A General Pathology 3.5 ECTS
040112A Physiology 15 ECTS
555280P Basic Course of Project Management 2 ECTS
764627A Virtual Measurement Environments 5 ECTS
901020Y Swedish 3 ECTS (is held every second year)

040105Y Basic Epidemiology 1.5 ECTS

521337A Digital Filters 5 ECTS
580209A Bachelor’s Thesis 10 ECTS
580211A Maturity Test 0 ECTS

In total 46 or 49 ECTS + optional studies

Optional Studies 11.5 ECTS

Optional studies are selected among basic and intermediate studies that support the degree so that the total extent of the degree is at least 180 credits. In the case of optional studies, if necessary, the student must agree with the organizing department for the participation to the course. Optional studies may include practical training in the field of biomedical engineering of up to 4 credits (course code 580120A Practical training 1).

Recommended optional studies for Bachelor's degree:

031018P Complex Analysis 4 ECTS
031022P Numerical Analysis 5 ECTS
465075A Research Techniques for Materials 3,5 ECTS
521144A Algorithms and Data Structures 6 ECTS
521432A Electronics Design I 5 ECTS

580201A Biomedical Engineering Programming Study 5 ECTS

750340A Basics of bioinformatics 3 ECTS

753124P Concepts of genetics 4 ECTS
764115P Foundations of cellular biophysics 2 ECTS
766326A Atomic physics 1 6 ECTS (replaces the course 761105P Atomic and Nuclear Physics 3 ECTS)
766328A Thermophysics 6 ECTS (replaces the course 761102P Basic Thermodynamics 2 ECTS)
763333A Solid state physics 4 ECTS

766334A Nuclear and particle physics 2 ECTS
811338A Internet and Networks 5 ECTS
811168P Information Security 5 ECTS
811170P Introduction to Information Systems Analysis and Design 6 ECTS

LEARNING OUTCOMES

After graduation in the Bachelor's Degree Program, a graduate can

- identify the key structures and functions of human organs
- use mathematical methods to describe and analyze technical problems
- apply the terminology and concepts of mathematics and physics to describe the functioning of human organs
- conduct basic technical measurements and analyze results
- design simple software by using different programming tools
- identify invocation potential of technology in the treatment of diseases and promotion of health
- use and apply the obtained knowledge with creative and critical manner in the working tasks of the field
- communicate independently using the domestic language, and communicate with international audience using at least one foreign language
- take responsibility for independent working tasks, work as a team member, and use communication skills in own working tasks as well as in communication with outsider audience
- follow and interpret trends and developments in the field, and develop own know-how accordingly
- identify needs to improve own knowledge, and use different learning and working methods for developing own know-how continuously

Master's Degree Programme in Medical Technology – 120 ECTS

ADMISSION REQUIREMENTS

Students who have completed Bachelor’s degree in Medical and Wellness Technology at the University of Oulu are directly admitted to study for Master’s degree programme of Medical and Wellness Technology.

ADMISSION TO MASTER’S PROGRAMME

Students with Bachelor’s (or higher) degree in an applicable field are selected directly to study for Master of Health Sciences in degree programme of Medical and Wellness Technology. **A maximum of three students with bachelor’s degree from the University of Applied sciences and the maximum of three students with Bachelor’s degree from University** are selected.

Admission requirements and selection criteria

Prerequisities for Master’s degree programme are

(1) Bachelor’s (or higher) degree **from the University of Applied sciences** in biomedical engineering, health technology or corresponding fields. The credit-weighted average grade of the Bachelor studies must be at least 3,5/5.

or

(2) **University level Bachelor’s degree in Science or Engineering suitable for biomedical engineering studies (e.g. biophysics or electrical engineering)**. The suitability of the degree is assessed based on the amount of supplementary studies needed.

In both allotments, applications are evaluated based on the average grade of the Bachelor’s degree certificate (weight 50%) and the amount of supplementary studies needed (weight 50%).

Supplementary studies

Before the actual Master degree studies the students admitted to the programme need to complete supplementary studies. The extent of supplementary studies depends on previous studies and can be a maximum of 60 ECTS credits. The purpose of supplementary studies is to ensure success in Master degree studies. Supplementary studies may include e.g. Math and biomedicine. Supplementary studies are not included in the Master's degree.

FLEXIBLE STUDY PATHS

Biomedical engineering study path: Students who have completed the Bachelor's degree in science or engineering related to biomedical engineering **in the University of Oulu** can be selected to the Master's degree programme in Medical and Wellness Technology. A maximum of three students are selected. The suitability of the degree is assessed based on the amount of supplementary studies needed.

Prerequisities as a part of bachelor's degree:

040005Y Biostatistics 3 ECTS

040302Y Basic Human Anatomy and Physiology 6 ECTS
080901A Introduction to Technology in Clinical Medicine 6 ECTS

764103P Introduction to biophysics 3 ECTS

The following courses are required as master phase study path courses:

040112A Physiology 15 ECTS
764317A Radiation physics, biology and safety 3 ECTS

Every student who has been selected to the programme completes all 120 credits needed for Master's degree in Health Sciences, and the above mentioned courses if they are not included in the Bachelor's or Master's degree. Applications are evaluated based on the average grade of the Bachelor's degree certificate (weight 50%) and the amount of supplementary studies needed (weight 50%).

STUDIES IN MASTER'S DEGREE PROGRAMME

Studies include compulsory intermediate and advanced studies, advanced module's studies and optional studies. The student executes compulsory studies (34 ECTS), studies of chosen advanced module (at least 28 ECTS) and optional studies so that the total extent of the degree is at least 120 credits. Studies are executed according to individual timetable depending on the optional studies. The language of instruction can be English in some courses. Some of the courses are held only every second year.

Compulsory Studies

Intermediate Studies 6 ECTS

764364A Biosystems analysis and simulation 6 ECTS 1/Spring

Advanced Studies 30 ECTS

080914S Biomedical Engineering and Medical Physics Seminar 3 ECTS 2/Spring
521107S Biomedical Instrumentation 6 ECTS 1/Spring
521124S Sensors and Measuring Techniques 5 ECTS 1/Autumn
521273S Biosignal Processing 5 ECTS 1/Autumn
764634S Medical Physics and Imaging 6 ECTS 1/Autumn
764660S Bioelectronics 5 ECTS 2/Spring

Studies of Advanced Module

(one advanced module will be chosen from which need to be executed at least 28 ECTS credits)

Biomedical Technology (31 ECTS)

040911S Using animals in research - carrying out procedures 2,5 ECTS 1/Spring
080915S Tissue Biomechanics 4 ECTS 1/Autumn

465075A Research Techniques for Materials 3,5 ECTS 2/Autumn

580401A Basic Biomaterials 2 ECTS 1/Autumn
580402S Biomedical Imaging Methods 4 ECTS 2/Spring

764359A Spectroscopic Methods 5 ECTS 1/Spring
080917S Project in Biomedical Technology 10 ECTS 2/Autumn

Medical Imaging (33 ECTS)

080910A Applied Diagnostic Radiology 4 ECTS 1/Autumn
521467S Digital Image Processing 5 ECTS 1/Autumn
521466S Machine Vision 5 ECTS 1/Spring
521497S Pattern Recognition and Neural Networks 5 ECTS 1/Spring
580402S Biomedical Imaging Methods 4 ECTS 2/Spring
080918S Project in Medical imaging 10 ECTS 2/Autumn

Health technology (33,5 ECTS)

040404A Health technology and rehabilitation 5 ECTS 1/Spring
080916S Biomechanics of Human Movement 3 ECTS 1/Spring

521114S Wireless Measurements 4 ECTS 1/Spring
521171A Electronic Measurement Techniques 6,5 ECTS 1/Autumn
555364S Ergonomics 5 ECT 2/Autumn
080919S Project in Health Technology 10 ECTS 2/Autumn

Master's Thesis and Maturity Test 35 ECTS

580210S Master's Thesis 35 ECTS 2/Autumn-Spring
580211S Maturity Test

Optional Studies (about 21 ECTS)

Optional studies will be executed so that the total extent of the degree is at least 120 credits. Optional studies can be chosen from other advanced module or from other intermediate and advanced studies that support the degree. In the case of optional studies, if necessary, the student must agree with the organizing department for the participation for

the course. Optional studies may include practical training in the field of biomedical engineering of up to 4 credits (580121A Practical training 2).

Recommended optional studies for advanced module Biomedical Technology:

747604S Introduction to biocomputing 3 ECTS
750340A Basics of bioinformatics 3 ECTS
764323A Cell Membrane Biophysics 7 ECTS
764338A Basic Neuroscience 5 ECTS
764619S Molecular biophysics 4 ECTS
764620S Hemodynamics 4 ECTS
764629S Identification of linear systems 5 ECTS
764640S Intracellular recordings, 3 ECTS
764641S Patch-clamp techniques, 3 ECTS
764668S Simulation of biosystems 5 ECTS

Recommended optional studies for advanced module Medical Imaging:

031044A Mathematical Methods 3 ECTS
031028S Mathematical Signal Processing 6 ECTS
521280S DSP-laboratory Work 5 ECTS
521413A Digital Techniques I 4 ECTS
521432A Electronics Design I 5 ECTS
521478S Digital video processing 5 ECTS
580201A Biomedical Engineering Programming Study 5 ECTS

766661S NMR Imaging 8 ECTS

Recommended optional studies for advanced module Health Technology:

031044A Mathematical Methods 3 ECTS
031028S Mathematical Signal Processing 6 ECTS
461028S Experimental Methods in Engineering Mechanics 6 ECTS
464085A Patenting 3.5 ECTS
521280S DSP-laboratory Work 5 ECTS
521238S Optoelectronic Measurements 4 ECTS
521413A Digital Techniques I 4 ECTS
521432A Electronics Design I 5 ECTS

555365S Computer-Aided Methods in Ergonomics 3 ECTS
580201A Biomedical Engineering Programming Study 5 ECTS

LEARNING OUTCOMES

After graduation in the Master's Degree Program, a graduate can, in addition to the know-how obtained in the Bachelor degree,

- obtain and evaluate critically novel knowledge and special know-how in the field, and use and apply it independently and creatively in the medical technology research and development (R&D) in the field of own specialization studies

- conduct research work by using scientific research methods

- produce new knowledge for the needs of industry and society
- participate in the industrial R&D and expert tasks in the field
- set personal goals and work independently as well as in a team in order to achieve goals
- communicate clearly and analytically viva voce and by writing
- extend and deepen own know-how independently in the spirit of lifelong learning

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

764364A: Analysis and simulation of biosystems, 6 op
080912S-01: Applied Biomechanics, Written assignment nr 1, 0 op
080912S-02: Applied Biomechanics, Written assignment nr 2, 0 op
080910A: Applied Diagnostic Radiology, 4 op
080910A-02: Applied Diagnostic Radiology, Home exam, 0 op
080910A-01: Applied Diagnostic Radiology, Seminar, 0 op
761105P: Atomic and Nuclear Physics, 3 op
580209A: Bachelor's Thesis, 10 op
040901Y: Basic Anatomy, 1,5 - 2 op
580401A: Basic Biomaterials, 2 op
555280P: Basic Course of Project Management, 2 op
040105Y: Basic Epidemiology, 1,5 op
761101P: Basic Mechanics, 4 op
761102P: Basic Thermodynamics, 2 op
041201A: Basics in eHealth, 5 op
764660S: Bioelectronics, 5 op
080916S: Biomechanics of Human Movement, 5 op
580201A: Biomedical Engineering Programming Study, 5 op
580202S: Biomedical Engineering Project, 5 op
080914S: Biomedical Engineering and Medical Physics Seminar, 3 op
580402S: Biomedical Imaging Methods, 1 - 5 op
521107S: Biomedical Instrumentation, 6 op
764324A: Biophysical laboratory exercises I, 5 op
521273S: Biosignal Processing, 5 op
Compulsory
521273S-01: Biosignal Processing I, Exam, 0 op
521273S-02: Biosignal Processing I, Exercise Work, 0 op
040005Y: Biostatistics, 3 op
031010P: Calculus I, 5 op
031011P: Calculus II, 6 op
764323A: Cell membrane biophysics, 7 op
050004Y: Chemistry, 3 op
521302A: Circuit Theory 1, 5 op
031017P: Differential Equations, 4 op
521337A: Digital Filters, 5 op
Compulsory
521337A-01: Digital filters, partial credit, 0 op
521337A-02: Digital filters, partial credit, 0 op
521467S: Digital Image Processing, 5 op
521109A: Electrical Measurement Principles, 5 op
761103P: Electricity and Magnetism, 4 op
521141P: Elementary Programming, 5 op
521142A: Embedded Systems Programming, 5 op
555364S: Ergonomics, 5 op
040408S: Exercise and Work Physiology, 1 op

764115P: Foundations of cellular biophysics, 4 op
040108A: General Pathology, 3,5 - 5 op
040404A: Health technology and rehabilitation, 5 op
811338A: Internet and Computer Networks, 5 op
580102P: Introduction to Medical and Wellbeing Technology, 5 op
580102P-02: Introduction to Medical and Wellbeing Technology, exam, 0 op
580102P-01: Introduction to Medical and Wellbeing Technology, lectures, attendance, 0 op
080901A: Introduction to Technology in Clinical Medicine, 5 op
080901A-04: Introduction to Technology in Clinical Medicine, Exam, 0 op
080901A-01: Introduction to Technology in Clinical Medicine, Initial exam, 0 op
080901A-02: Introduction to Technology in Clinical Medicine, Lectures and demonstrations, 0 op
080901A-03: Introduction to Technology in Clinical Medicine, Written assignment, 0 op
580101Y: Introduction to University Studies, 2 op
580101Y-02: Introduction to University Studies, conversation, 0 op
580101Y-01: Introduction to University Studies, tutorial, 0 op
764103P: Introduction to biophysics, 2 op
040007Y: Introduction to scientific research, 1,5 op
040910S: Laboratory Animal Course For Scientists, 6 op
761121P: Laboratory Exercises in Physics 1, 3 op
521466S: Machine Vision, 5 op
Compulsory
521466S-01: Machine Vision, Exam, 0 op
521466S-02: Machine Vision, Exercise work, 0 op
031019P: Matrix Algebra, 3,5 op
580211S: Maturity Test, 0 op
580211A: Maturity Test, 0 op
040902Y: Medical Biochemistry and molecular biology, 8 - 9 op
040002Y: Medical cell and developmental biology, 7 op
040002Y-01: Medical cell and developmental biology, examination, 0 op
040011Y: Medical informatics, 2 op
040011Y-01: Medical informatics, module 1, information and Communication Technology, 0,5 op
040011Y-02: Medical informatics, module 2, literature retrieval, 1 op
040011Y-03: Medical informatics, module 3, clinical information systems, 0,5 op
764634S: Medical physics and imaging, 5 op
764680S: Neural information processing, 5 op
521497S: Pattern Recognition and Neural Networks, 5 op
Compulsory
521497S-01: Pattern Recognition and Neural Networks, Exam, 0 op
521497S-02: Pattern Recognition and Neural Networks; Exercise Work, 0 op
040112A: Physiology, 15 op
580121A: Practical training, 1 - 5 op
580120A: Practical training 1, 1 - 5 op
521431A: Principles of Electronics Design, 5 op
580210S: Pro Gradu, 35 op
080917S: Project in Biomedical Technology, 5 - 10 op
080919S: Project in Health Technology, 5 - 10 op
080918S: Project in Medical Imaging, 5 - 10 op
764317A: Radiation physics, biology and safety, 3 op
902006Y: Reading for Academic Purposes, 1,5 op
902007Y: Scientific Communication, 1,5 op
901020Y: Second Official Language (Swedish), 3 op
521124S: Sensors and Measuring Techniques, 5 op
031050A: Signal Analysis, 4 op
764359A: Spectroscopic methods, 5 op
080915S: Tissue Biomechanics, 5 op
764327A: Virtual measurement environments, 5 op
761104P: Wave Motion, 3 op
521114S: Wireless Measurements, 4 op
Compulsory
521114S-01: Wireless Measurements, exam, 0 op
521114S-02: Wireless Measurements, exercise work, 0 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

764364A: Analysis and simulation of biosystems, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

764664S Analysis and simulation of biosystems 6.0 op

ECTS Credits:
6 credits
Language of instruction:
Finnish (or English)
Timing:
3th spring
Learning outcomes:
The student is able to use modelling in the analysis of simple biosystems, with the utilization of the concept of analogies between different types of systems. Further, with those skills the student will be able to build simulations of relatively simple biosystems and analyze their properties.
Contents:
Models and analogies are studied as tools to analyse biological systems. Also the foundations of system identification and feedback are considered, and especially the utilization of transfer function and impedance in identification and analysis. Building on this simulation methods will be examined.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 36 h, calculation exercises 15 h, self-study 109 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Basic biophysics (764162P) is recommended before this course. Knowing Laplace transform is useful.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lecture handouts; M.C.K. Khoo: Physiological Control Systems, IEEE Press, New York, 2000; P. Doucet, P.B. Sloep: Mathematical modeling in the life sciences, Ellis Horwood limited, Chichester, 1992 (partly).
Course material availability can be checked here.
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:
Matti Weckström, Iikka Salmela
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764364A/

080912S-01: Applied Biomechanics, Written assignment nr 1, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish or English
Timing:
Master studies, spring semester
Learning outcomes:
After this course student has deeper knowledge in biomechanics in theory and in practice. The student will familiarize with the research methods and data analysis in experimental and clinical biomechanics by practical exercises.
Contents:
Musculoskeletal biomechanics, biomechanical measurements
Learning activities and teaching methods:
Lectures 8 hrs, participation. Practical exercise 8 hrs, independent work. Written reports
Recommended optional programme components:
761101P Basic Mechanics, 580103A Basic Biomechanics, physiology.
Recommended or required reading:
Material given in the lectures. Literature.
Assessment methods and criteria:
Written reports based on the labs.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Professori Timo Jämsä
Other information:
This course is a part of specialization Medical Engineering.

080912S-02: Applied Biomechanics, Written assignment nr 2, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish or English
Timing:
Master studies, spring semester
Learning outcomes:
After this course student has deeper knowledge in biomechanics in theory and in practice. The student will familiarize with the research methods and data analysis in experimental and clinical biomechanics by practical exercises.

Contents:
Musculoskeletal biomechanics, biomechanical measurements
Learning activities and teaching methods:
Lectures 8 hrs, participation. Practical exercise 8 hrs, independent work. Written reports
Recommended optional programme components:
761101P Basic Mechanics, 580103A Basic Biomechanics, physiology.
Recommended or required reading:
Material given in the lectures. Literature.
Assessment methods and criteria:
Written reports based on the labs.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Professori Timo Jämsä
Other information:
This course is a part of specialization Medical Engineering.

080910A: Applied Diagnostic Radiology, 4 op

Voimassaolo: - 31.07.2016

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
4 ECTS
Language of instruction:
Finnish
Timing:
Master studies, autumn-spring (the course isorganised every other year).
Learning outcomes:
The student can explain the basic principles of medical imaging technoqies, possibilities of use and limitations. The student can define how and by what conditions are required to produce an image with acceptable diagnostic quality and what features are essential for interpreting images.
Contents:
Course gives insight to radiological work (conventional X-rays, computed tomography, ultrasound examinations, magnetic resonance imaging and radiological operations). Seminars include radiological examinations from the technical point of view combining technical and medical knowledge.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 20 hrs. Seminars and demonstrations 20 hrs. Selected lectures from the course 080602A (see the ECTS guide for the Faculty of Medicine). Final exam.
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, students of medical technology from faculty of technology).
Recommended or required reading:
S Soimakallio (ed), L Kivisaari, H Manninen, E Svedström, O Tervonen. Radiologia, WSOY, 2005.
Assessment methods and criteria:
Seminar presentation and final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail, seminar weighted as 2/3 and final exam grade as 1/3 in the final grade.
Person responsible:
Dr. Pasi Pulkkinen
Working life cooperation:
No
Other information:

This course is a part of specialization Medical Engineering. .

080910A-02: Applied Diagnostic Radiology, Home exam, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Koivula, Kalle Antero
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
Master studies, autumn-spring
Learning outcomes:
After this course student knows the theoretical basics, usability and restrictions of different medical imaging techniques. The student knows how an image of good quality is obtained and what is essential when interpreting the images.
Contents:
Course gives insight to radiological work (conventional X-rays, computed tomography, ultrasound examinations, magnetic resonance imaging and radiological operations). Seminars include radiological examinations from the technical point of view combining technical and medical knowledge.
Learning activities and teaching methods:
Lectures 20 hrs. Seminars and demonstrations 20 hrs. Selected lectures from the course 080602A (see the ECTS guide for the Faculty of Medicine). Final exam.
Recommended or required reading:
S Soimakallio (ed), L Kivisaari, H Manninen, E Svedström, O Tervonen. Radiologia, WSOY, 2005.
Assessment methods and criteria:
Seminar presentation and final exam are graded 1–5 or fail. Seminar grade is weighted as 2/3 and final exam grade as 1/3 in the final grade.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Doc Antero Koivula
Other information:
This course is a part of specialization Medical Engineering. For more information, please contact Dr Pasi Pulkkinen.

080910A-01: Applied Diagnostic Radiology, Seminar, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Koivula, Kalle Antero
Opintokohteen kielet: Finnish

ECTS Credits:
4 credits
Language of instruction:
Finnish

Timing:
Master studies, autumn-spring
Learning outcomes:
After this course student knows the theoretical basics, usability and restrictions of different medical imaging techniques. The student knows how an image of good quality is obtained and what is essential when interpreting the images.
Contents:
Course gives insight to radiological work (conventional X-rays, computed tomography, ultrasound examinations, magnetic resonance imaging and radiological operations). Seminars include radiological examinations from the technical point of view combining technical and medical knowledge.
Learning activities and teaching methods:
Lectures 20 hrs. Seminars and demonstrations 20 hrs. Selected lectures from the course 080602A (see the ECTS guide for the Faculty of Medicine). Final exam.
Recommended or required reading:
S Soimakallio (ed), L Kivisaari, H Manninen, E Svedström, O Tervonen. Radiologia, WSOY, 2005.
Assessment methods and criteria:
Seminar presentation and final exam are graded 1–5 or fail. Seminar grade is weighted as 2/3 and final exam grade as 1/3 in the final grade.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Doc Antero Koivula
Other information:
This course is a part of specialization Medical Engineering. For more information, please contact Dr Pasi Pulkkinen.

761105P: Atomic and Nuclear Physics, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766326A Atomic physics 1 6.0 op

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
The course is not lectured any more. It can be completed in this form by a final examination.
Learning outcomes:
The student can explain the basic principles of atomic, nuclear and particle physics and can derive their consequences in the extent and level of the lectures (see Contents). In addition, he/she can solve problems which require profound understanding of the essential contents of the course.
Contents:
The microscopic building blocks of matter, for example atoms and their nuclei, do not obey the laws of classical physics. The fundamental theories of modern physics, the theory of relativity and quantum mechanics, are required to describe them. Both theories involve some radical changes in our views of the physical world, especially of the nature of space, time, matter and radiation. This course is an introduction to these two theories that underlie our modern world view, and to their application to the description of atoms, nuclei, and fundamental particles. Topics will include: Relativity. Photons, electrons, and atoms. The wave nature of particles. Quantum mechanics. Atomic structure. Nuclear physics. Particle physics.
Mode of delivery:
Self-study or face-to-face teaching
Learning activities and teaching methods:
80 h independent work, or 23 h lectures, 12 h exercises and 45 h independent work in the course 766326A Atomic physics 1.
Target group:

No specific target qroup
Prerequisites and co-requisites:
No specific prerequisites
Recommended optional programme components:
From the autumn 2009 onwards, the course is a part of the course *766326A Atomic physics 1* whose first intermediate examination constitutes its concluding examination.
Recommended or required reading:
Textbook: H. D. Young and R. A. Freedman: University Physics, 13th edition, Pearson Addison-Wesley, 2012, or earlier editions (in part).
Lecture notes: Juhani Lounila: 761105P Atomi- ja ydinfysiikka, Oulun yliopisto, 2009.
Course material availability can be checked here.
Assessment methods and criteria:
Written intermediate examination or final examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Juhani Lounila (former course) and Marko Huttula (new course)
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761105P/ and
https://wiki.oulu.fi/display/766326A/

580209A: Bachelor's Thesis, 10 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish or English
Timing:
3rd year
Learning outcomes:
The studend can describe a research problem, solve it and reports this both in written form. The student can present his study orally at the seminar.
Contents:
Guided research or development work in the field of medical & wellness technology and writing of the thesis.
Mode of delivery:
Indpendent work.
Learning activities and teaching methods:
Independent work with the help of a supervisor. The topic and contents should be discussed with the professor in the beginning. Thesis can be made at different research groups of the university or in industry or health care system.
Target group:
Bachelor Students of Medical and Wellness Technology.
Assessment methods and criteria:
Writing the thesis and an oral presentation.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No

Other information:
It is recommended that before starting to do the bachelor's thesis student has completed 130-150 credits.

040901Y: Basic Anatomy, 1,5 - 2 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
1st Spring
Learning outcomes:
After this course student is familiar with the basic anatomy of the human body.
Learning activities and teaching methods:
Lectures 20 h. Final exam
Recommended or required reading:
Material given in the lectures.
Assessment methods and criteria:
Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Other information:
Students have to register according to the instructions of the study advisor.This course is organized by the open university.

580401A: Basic Biomaterials, 2 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
2 ECTS
Language of instruction:
Finnish or english
Timing:
Master studies, Autumn. The course is not organized every year.
Learning outcomes:
The student can list essential biological and tissue-replacing materials and can describe their properties. The student identifies and can explain the basics of interactions between biomaterials and tissues.
Contents:
Biocompatibility, metallic and ceramic implantation materials, polymers, biodegradable materials, bioglass, multifunctional biomaterials, tissue engineering, examples of applications.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures (18 h) and written exam.
Target group:

Master Students of Medical and Wellness technology and all other who are intressed in biomaterials.
Recommended or required reading:
Lecture material. Literature: Park JP, Bronzino JD, Biomaterials; Principles and Applications. CRC Press 2002.
Assessment methods and criteria:
Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
This course is a part of specialization Biomedical Technology.

555280P: Basic Course of Project Management, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Jaakko Kujala

Opintokohteen kielet: Finnish

Leikkaavuudet:

555288A	Project Management	5.0 op
555285A	Project management	5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
2 ECTS credits.
Language of instruction:
Finnish
Timing:
Periods 1-3.
Learning outcomes:
Upon completion the student can explain the essential concepts related to project management. He/she can present the main features of a project plan and can use different methods of partitioning a project. The student can also schedule a project and estimate its costs. The student can explain the terms related to Earned value method and can apply the method on simple tasks. Upon completion the student recognizes the essential tasks of project risk management.
Contents:
Defining project management, project planning, organising and scope management, schedule management, cost management, earned value calculation and project risk management.
Mode of delivery:
Face-to-face learning.
Learning activities and teaching methods:
Lectures, weekly assignments and exercise book. The final grade is derived from the course exam.
Target group:
-
Prerequisites and co-requisites:
None.
Recommended optional programme components:
-
Recommended or required reading:
Lecture material, exercise book. Artto, Martinsuo & Kujala 2006. Projektiliiketoiminta. WSOY, ISBN: 951-0-31482-X (applicable sections), available at http://pbgroup.aalto.fi/en/the_book_and_the_glossary/.
Assessment methods and criteria:
Week assignments and final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5

Person responsible:
Professor Jaakko Kujala.
Working life cooperation:
No

040105Y: Basic Epidemiology, 1,5 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Jouni Jaakkola
Opintokohteen kielet: Finnish

ECTS Credits:
1.5 ECTS
Language of instruction:
Finnish/English
Timing:
Second year, spring term (C4)
Learning outcomes:
Students are expected to learn the basic concepts of epidemiology and basics of epidemiologic methods used in medicine and in general in health sciences.
Contents:
The course includes a lecture on the following topics: 1) introduction to basic concepts and causality, 2) principles of study design, 3) precision and validity, 4) exposure assessment, 5) assessment of health effects and measures of disease occurrence, association and effect , 6) principles of cohort studies, 7) data analysis in cohort studies, 8) principles of case-control studies, 9) data analysis in case-controls studies and 10) cross-sectional studies. In addition, the course includes two exercise sessions conducted in small groups on: 1) epidemiologic methods based on critical reviews of articles and 2) calculation. Students will also review individually and critically an scientific article.
Mode of delivery:
Lectures and face-to-face teaching
Learning activities and teaching methods:
10 one-hour lectures, two 3-hour exercise sessions and critical review of an articles.
Target group:
Second year medical and dental medical students. Suitable also for students planning research in health sciences.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
Closely linked to the course in biostatistics taught in the same term.
The course has to be completed before 3 rd year dental and medical studies.

Recommended or required reading:
Lecture notes. Recommended books: Hernberg S. Introduction to occupational epidemiology (1998) and Rothman K. Epidemiology. An Introduction (2002).
Assessment methods and criteria:
Lectures highly recommended and exercise sessions compulsory. Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical scale 1-5. Zero stands for a fail.
Person responsible:
Jouni J.K. Jaakkola, professor of public health.
Working life cooperation:
No.

761101P: Basic Mechanics, 4 op

Opiskelumuoto: Basic Studies

Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761118P Mechanics 1 5.0 op
761118P-01 Mechanics 1, lectures and exam 0.0 op
761118P-02 Mechanics 1, lab. exercises 0.0 op
761111P-01 Basic mechanics, lectures and exam 0.0 op
761111P-02 Basic mechanics, lab. exercises 0.0 op
761111P Basic mechanics 5.0 op
761101P2 Basic Mechanics 4.0 op

ECTS Credits:
4 credits
Language of instruction:
The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.
Timing:
Autumn
Learning outcomes:
The student is able to describe the basic concepts of mechanics and to apply those when solving the problems related to mechanics.
Contents:
We encounter many phenomena related to mechanics in our everyday life. Most engineering sciences are based on mechanics and mechanics forms the basis of many other fields of physics, including modern physics.
Contents in brief: Short summary of vector calculus. Kinematics, projectile motion and circular motion. Newton's laws of motion. Work and different forms of energy. Momentum, impulse and collisions. Rotational motion and moment of inertia. Torque and angular momentum. Rigid body equilibrium problems. Gravitation. Periodic motion. Fluid mechanics.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 h, 8 exercises (16 h), self-study 59 h
Target group:
For the students of the University of Oulu
Prerequisites and co-requisites:
Knowledge of vector calculus and basics of differential and integral calculus
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 1-14. Also older editions can be used.
Lecture material: Finnish lecture material will be available on the web page of the course.
Course material availability can be checked here.
Assessment methods and criteria:
Four mini examinations and end examination or final examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Anita Aikio
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761101P/

761102P: Basic Thermodynamics, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766348A	Thermophysics	7.0 op
766328A	Thermophysics	6.0 op

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
Every autumn term
Learning outcomes:
The student will learn to recognize and understand ordinary thermodynamic phenomena taking place around us as well as to take them into account and utilize them, for instance, in designing devices and buildings.
Contents:
We cover the basics of temperature, heat and thermal properties of matter both in macroscopic and microscopic levels. Topics in detail: Temperature, thermometers, heat, thermal properties of matter (e.g. thermal expansion, specific heat, phase changes), equations of state, the laws of thermodynamics, heat engines (e.g. internal-combustion engine), refrigerators, the Carnot cycle, entropy.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 16 h, 4 exercises (8 h), self-study 29 h
Target group:
For the students of the University of Oulu
Prerequisites and co-requisites:
No specific prerequisites
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Young and Freedman; University Physics, Addison Wesley (Edition 10, Chapters 15-18, or Editions 11-12, Chapters 17-20). Similar material can also be found in H. Benson: University physics, Wiley & Sons, New York (Chapters 18-21).
Lecture notes: Basic thermodynamics (in Finnish) by K. Mursula.
Course material availability can be checked here.
Assessment methods and criteria:
2 intermediate examinations (in autumn) or final examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Ville-Veikko Telkki
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761102P/

041201A: Basics in eHealth, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Jarmo Reponen

Opintokohteen kielet: English

Leikkaavuudet:

ay041201A Basics in eHealth (OPEN UNI) 5.0 op

ECTS Credits:
5 ECTS
Language of instruction:
Finnish or english
Timing:
2 nd year spring
Learning outcomes:
The student can define central information and communication technological terms and solutions in healthcare, and can list respective applications in healthcare services and trainin.
Contents:
- terms and concepts
- social dimensions
- delivery o health services
- human interaction
- electronic patient records and data transfer
- remote consulations, radiology, surgery (in Finnish), psychiatry
- economic assessment
- functional assessment
- education
- techncal requirements (in Finnish)
- data security and legislation (in innish)

Mode of delivery:
Web-based teaching
Learning activities and teaching methods:
Interactivity takes place in virtual learning environment Optima. The course consists of video-tape lectures, power point-dias and links to other material available in the web. Performance of duties includes an essay, exam, participating in discussions on the grounds of the lectures.
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, students of medical technology from faculty of technology), Students o Health Sciences and information technology and all other who are intrested.
Recommended or required reading:
All recommended or required reading are offered in virtual learning environment Optima.
Assessment methods and criteria:
Web tasks, an essay and final exam.
Grading:
1-5 or fail
Person responsible:
Jarmo Reponen
Working life cooperation:
No

764660S: Bioelectronics, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th spring

Learning outcomes:
Students have basic skills for understanding and analyzing of electronics and its applications to measurements of living organisms.
Contents:
The course introduces bioelectric recording techniques, electrodes, most commenly used amplifier types, basic signal processing of biosignals, but also concepts related to the origin of bio-potentials and currents and how they are distributed in biological volume conductors.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 24 h, MatLab-based project work 10 h, calculation exercises 15 h, self-study 84 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Physics courses, programming skills.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lectures and lecture notes. Books e.g. Semmlov J, Circuits signals and systems for bioenergetics, Elsevier Academic Press, 2005; Electronic Signal Processing, parts I-IV, The Open University Press, Milton Keynes 1984. Course material availability can be checked here.
Assessment methods and criteria:
Final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Matti Weckström
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764660S/

080916S: Biomechanics of Human Movement, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
3 ECTS
Language of instruction:
English, Finnish if needed
Timing:
Master studies, Spring
Learning outcomes:
The student can describe the main challenges of movement biomechanics and principles for motion analysis. The student knows basics of biomechanical measurement and modeling of movement. The student can perform practical biomechanical experiments, analyze measurement data, interpret results, and report them using good scientific reporting practice.
Contents:
Musculoskeletal biomechanics. Motion analysis. Biomechanical modeling of the body. Exercise biomechanics and measurement of physical activity. Biomechanical measurements.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:

Lectures, exercises, independent work, report writing
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, students of medical technology from faculty of technology) and all other who are interested.
Prerequisites and co-requisites:
761101P Basic Mechanics. Physiology course is recommended.
Recommended or required reading:
Material given during lectures. Additional reading: Hall: Basic biomechanics, 3. edition. McGraw-Hill,1999.
Assessment methods and criteria:
Accepted exercises, written exam. The exam includes definition and explanation assignments and problems.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or failed
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
This course is a part of the specialization of Health Technology.

580201A: Biomedical Engineering Programming Study, 5 op

Voimassaolo: 01.08.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS
Language of instruction:
Finnish or English
Timing:
Bachelor of Master studies, elective course.
Learning outcomes:
The student can design a solution to a programmig problem related to medical technology, can solve the task and report this in written form.
Contents:
Independent computer programming using modern programming tools, a written report.
Mode of delivery:
Independent work.
Learning activities and teaching methods:
Students carry out an assigned programming project individually or in pairs and write out a report.
Target group:
Student of Medical and Wellness Technology.
Prerequisites and co-requisites:
811122P Introduction to Programming and 764627S Virtual Measurement Environments
Assessment methods and criteria:
The program and the report are assessed by the supervisor.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
More information on the available topics can be inquired on the assistants of the department.

580202S: Biomedical Engineering Project, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
5-10 ECTS.
Language of instruction:
Finnish or English
Timing:
Master studies, elective course
Learning outcomes:
Learning outcomes: The student can solve a research problem and report this in written form.
Contents:
Working with a project
Learning activities and teaching methods:
Student takes part in a research or a developmental project carried out either in the University or outside. Student writes out a report and presents it orally. The project can be linked to a summer job or practical training.
Assessment methods and criteria:
Written report and oral presentation
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä

080914S: Biomedical Engineering and Medical Physics Seminar, 3 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS
Language of instruction:
Finnish or English
Timing:
Master studies, autumn or spring.
Learning outcomes:
The student can identify the essential features of scientific publications. The student can present the central content of a scientific article to others. The student can present critical questions related to a scientific presentation.
Contents:
Assigned topics are reviewed in seminar meetings.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Seminar presentations and conversations based on the presentations.
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, students of medical technology from faculty of technology).

Recommended or required reading:
Selected scientific articles.
Assessment methods and criteria:
Attending seminars, making presentations and acting as an opponent.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
Also for doctoral studies

580402S: Biomedical Imaging Methods, 1 - 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Simo Saarakkala

Opintokohteen kielet: English

ECTS Credits:
4 ECTS
Language of instruction:
English
Timing:
Master studies. The course is not organized every year.
Learning outcomes:
The student knows and can describe the basic principles and main applications of imaging techniques used in biomedical research.
Contents:
Differences between in vivo, ex vivo and in vitro imaging. Optical in vivo imaging, optical tomography, magnetic resonance imaging, Fourier transform infrared microspectroscopy, Raman microspectroscopy, micro-computed tomography, basics of image analysis and interpretion.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures, demonstrations, practical exercise. Final exam.
Target group:
Master Students of Medical and Wellness technlogy and all other who are inerest in methods of biomedical imaging.
Recommended or required reading:
Required literature is given in the lectures.
Assessment methods and criteria:
Exercises. Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail
Person responsible:
Docent Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of specialization of Biomedical Technology and Medical imaging.

521107S: Biomedical Instrumentation, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Electrical Engineering

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

521093S Biomedical Instrumentation 5.0 op

ECTS Credits:
6
Language of instruction:
English
Timing:
5-6
Learning outcomes:
After the course the student is capable to explain principles, applications and design of medical instruments most commonly used in hospitals. He/she can describe the electrical safety aspects of medical instruments and can present the physiological effects of electric current on humans. In addition the student is able to explain medical instrumentation development process and the factors affecting it. He/she also recognizes typical measurands and measuring spans and is able to plan and design a biosignal amplifier.
Contents:
Diagnostic instruments (common theories for medical devices, measurement quantities, sensors, amplifiers and registering instruments). Bioelectrical measurements (EKG, EEG, EMG, EOG, ERG), blood pressure and flow meters, respiration studies, measurements in a clinical laboratory, introduction to medical imaging methods and instruments, ear measurements, heart pacing and defibrillators, physical therapy devices, intensive care and operating room devices and electrical safety aspects.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures/exercises 54 h and self-study 100 h.
Target group:
Students interested in biomedical measurements.
Prerequisites and co-requisites:
None
Recommended optional programme components:
Course replaces course 521126S Biomedical measurements
Recommended or required reading:
R. S. Khandpur: Biomedical Instrumentation, Technology and Applications, McGraw-Hill, 2005 and J. G. Webster: Medical Instrumentation, Application and Design, 4th edition, John Wiley & Sons, 2010.
Assessment methods and criteria:
The course is passed by the final exam or optionally with the assignments/test agreed at the first lecture
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Igor Meglinski
Working life cooperation:
None
Other information:
None.

764324A: Biophysical laboratory exercises I, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521273S: Biosignal Processing, 5 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tapio Seppänen
Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
Lectures are given in Finnish or in English. Laboratory work is given in Finnish and English. The examination can be taken in Finnish or English.
Timing:
Autumn, periods 2 and 3.
Learning outcomes:
After passing the course, student knows special characteristics of the biosignals and typical signal processing methods. Student can solve small-scale problems related to biosignal analysis.

Contents:
Biomedical signals. Digital filtering. Time-domain and frequency-domain analysis, Nonstationarity of biomedical signals. Event detection. Signal characterization.

Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 10 hours (5 times 2 hours) and laboratory work 20 hours (10 times 2 hours), the rest as independent work, written exam.

Target group:
Computer Science and Engineering students and other Students of the University of Oulu.
Prerequisites and co-requisites:
The mathematical studies of the BSc of computer science and engineering or equivalent studies, digital filtering, programming skills.

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:
The course is based on the book "Biomedical Signal Analysis, A Case-Study Approach", R.M Rangayyan. 516 pages. + Lecture transparencies + Task assignment specific material.

Assessment methods and criteria:
Laboratory work is supervised by assistants who also check that the task assignments are completed properly. The course ends with a written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Tapio Seppänen
Working life cooperation:
No.

Compulsory

521273S-01: Biosignal Processing I, Exam, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tapio Seppänen
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

521273S-02: Biosignal Processing I, Exercise Work, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tapio Seppänen
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

040005Y: Biostatistics, 3 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS credits
Language of instruction:
Finnish
Timing:
C4
Learning outcomes:

By the end of the course the student should be able to:
- plan study designs and statistical computing in medical and dental research,
- obtain and analyze data with basic statistical methods,
- use basic statistical significance tests and inference methods,
- evaluate critically medical research reports

Contents:

Aims and phases of statistical research, planning statistical research, obtaining data, variable distributions (frequencies, graphs and statistics), basics in statistical inference and methods (estimates, significance tests and confidence limits), basic methods in comparing groups and estimating associations between variables, specific methods applied in medical research.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lessons 18 h, study-group sessions 12 h, practical projects and home-works 30 h.
Target group:
First year medical, dental and medical wellness technology students

Prerequisites and co-requisites:
None
Recommended optional programme components:
This course is a part of the studies in research skills.
Recommended or required reading:
Uhari M ja Nieminen P: Epidemiologia ja biostatistiikka. Duodecim, 2001.

Assessment methods and criteria:
Regular and active participation in the small group lessons and completion of a practical project. Written examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
0-5
Person responsible:
Docent Pentti Nieminen
Working life cooperation:
No
Other information:
This course is a part of the studies in research skills.

031010P: Calculus I, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Mathematics Division

Arvostelu: 1 - 5, pass, fail

Opettajat: Ilkka Lusikka

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay031010P Calculus I (OPEN UNI) 5.0 op

ECTS Credits:
5
Language of instruction:
Finnish
Timing:
Autumn semester, periods 1-3.
Learning outcomes:
After completing the course the student identifies concepts of vector algebra and can use vector algebra for solving problems of analytic geometry. The student can also explain basic characteristics of elementary functions and is able to analyse the limit and the continuity of real valued functions of one variable. Furthermore, the student can solve problems associated with differential and integral calculus of real valued functions of one variable.
Contents:
Vector algebra and analytic geometry. Limit, continuity, differential and integral calculus and applications of real valued functions of one variable. Complex numbers.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 55 h / Group work 22 h.
Target group:
-
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Grossmann, S.I.: Calculus of One Variable; Grossmann, S.I.: Multivariable Calculus, Linear Algebra and Differential Equations (partly); Adams, R.A.: A Complete Course Calculus (partly).
Assessment methods and criteria:

Intermediate exams or a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.
Person responsible:
Ilkka Lusikka
Working life cooperation:
-
Other information:
-

031011P: Calculus II, 6 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Mathematics Division
Arvostelu: 1 - 5, pass, fail
Opettajat: Ilkka Lusikka
Opintokohteen kielet: Finnish
Leikkaavuudet:

031075P	Calculus II	5.0 op
ay031011P	Calculus II (OPEN UNI)	6.0 op

ECTS Credits:
6
Language of instruction:
Finnish
Timing:
Spring semester, periods 4-6.
Learning outcomes:
After completing the course the student is able to examine the convergence of series and power series of real terms and estimate the truncation error. Furthermore, the student can explain the use of power series e.g. in calculating limits and approximations for definite integrals and is able to solve problems related to differential and integral calculus of real and vector valued functions of several variables.
Contents:
Sequences, series and power series of real terms. Differential and integral calculus of real and vector valued functions of several variables.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 62 h / Group work 26 h.
Target group:
-
Prerequisites and co-requisites:
The recommended prerequisite is the completion of the course 031010P Calculus I.
Recommended optional programme components:
-
Recommended or required reading:
Kreyszig, E.: Advanced Engineering Mathematics; Grossmann, S.I.: Multivariable Calculus, Linear Algebra and Differential Equations.
Assessment methods and criteria:
Intermediate exams or a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.

Person responsible:
Ilkka Lusikka
Working life cooperation:

-

Other information:

-

764323A: Cell membrane biophysics, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

764623S Cell membrane biophysics 7.0 op

ECTS Credits:
7 credits
Language of instruction:
English
Timing:
3rd or 4th autumn
Learning outcomes:
After finishing the course the student is able to describe the basics of cell membrane structure and function, to present the basic biophysical models describing the electrical function of the cell membrane, and to solve problems and calculations concerning these models. In addition, the student will be able make and present a short review and a talk about given scientific literature of this field.
Contents:
During the course the students will become acquainted with the central biophysical phenomena of the cell membrane, for example: the physical structure and properties of the cell membrane, lipids and proteins in the membrane, permeation and selectivity, ion channels and their kinetics. In addition they will get to know the basics about the theory of the intracellular or cell membrane recordings, the models describing the electrical function of the cell membrane and the analysis of these signals.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 30 h, calculation exercises 22 h, seminars 4-8 h, seminar presentation, weekly assignments, self-study 131 h
Target group:
Biophysics students: recommended in minor (LuK), compulsory in major (FM). Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Introduction to biophysics (764103P) and Foundations of cellular biophysics (764115P) are recommended to be done before this course.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lecture handouts; J. Keener, J. Sneyd: Mathematical Physiology, Springer, Berlin, 1998 (partly).; D. Johnston, S. Wu: Foundations of Cellular Neurophysiology, MIT Press, Cambridge MA, 1995 (partly).
Course material availability can be checked here.
Assessment methods and criteria:
Home exam, final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Kyösti Heimonen and Marja Hyvönen
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764323A/

050004Y: Chemistry, 3 op

Opiskelumuoto: General Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opettajat: Karppinen, Peppi Leena Elina
Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS
Language of instruction:
Finnish
Timing:
The course unit is held in the spring term.
Learning outcomes:
After finishing the module student should have a basic knowledge concerning chemistry.
Contents:

General and inorganic chemistry: Basic concepts of chemistry; structure of atom; chemical bond; chemical formula, reaction and equations, stoichiometry; thermodynamics; phase equilibrium; reaction kinetics; chemical equilibrium; acid/base equilibrium; electrochemistry. Organic chemistry: nomenclature of organic compounds; carbon bonds; stereochemistry; properties and reactions of organic compounds.
Mode of delivery:
Lectures, tutorial teaching, exam.
Learning activities and teaching methods:
Lectures 26 h, practice of calculations 6 h. Exam.
Target group:
Students of Medical and Wellness Technology.
Recommended or required reading:
Murray, R.K. (ed.): Harper's Illustrated Biochemistry, 28th edition, 2009.

R. Laitinen ja J. Toivonen: Yleinen ja epäorgaaninen kemia, soveltuvin osin. Otakustantamo. Harold Hart: Organic Chemistry. A short Course, Houghton Mifflin Company, 6. (1983) or updated edition.

Assessment methods and criteria:
Chemistry course includes 1 exam (4 essays, 0-2.5 p/essay, points needed for passing 4.75).

Read more about assessment criteria at the University of Oulu webpage.
Grading:
Accepted/Fail.
Person responsible:
Professor Johanna Myllyharju

521302A: Circuit Theory 1, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Electrical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Rahkonen, Timo Erkki
Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
Finnish. Exams can be arranged in English on demand.
Timing:
Autumn, periods 1-3
Learning outcomes:

After the course the student can

- write and solve the equations describing the operation of a given electrical circuit
- solve the sinusoidal steady-state solution using complex phasor arithmetics
- solve time responses of electric circuits
- simplify electrical circuits e.g. using equivalent circuits
- simulate simple circuits and choose an appropriate circuit simulation method

Contents:
Equation of basic circuit elements, circuit laws and systematic building of network equations. Calculation of time and frequency responses. Use of complex phasor arithmetics. Basics of the use of circuit simulators.
Mode of delivery:
Classroom.
Learning activities and teaching methods:
30h lectures, 22 h exercises, and a simulation exercise (10h)
Target group:
Finnish BSc students.
Prerequisites and co-requisites:
Matrix algebra, complex arithmetics, differential equations.
Recommended optional programme components:
-
Recommended or required reading:
Nilsson, Riedel: Electric Circuits (6th or 7th ed., Prentice-Hall 1996), Chapters 1-11.
Assessment methods and criteria:
Final exam. Also the simulation exercise must be passed.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Prof. Timo Rahkonen
Working life cooperation:
-
Other information:
-

031017P: Differential Equations, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Mathematics Division

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

800320A	Differential equations	5.0 op
031076P	Differential Equations	5.0 op

ECTS Credits:
4
Language of instruction:
Finnish
Timing:
Spring, period 4-6
Learning outcomes:
The students can apply differential equations as a mathematical model. They can identify and solve various differential equations and they have knowledge on basic solvability of differential equations. The student can use the Laplace transform as a solution method.
Contents:
Ordinary differential equations of first and higher order. Laplace transform with applications to differential equations.
Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
Lectures 44 h / Group work 28 h.
Target group:
-
Prerequisites and co-requisites:
The recommended prerequisite is the completion of the course 031010P Calculus I.

Recommended optional programme components:
-
Recommended or required reading:
Kreyszig, E.: Advanced Engineering Mathematics
Assessment methods and criteria:
Intermediate exams or a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.
Person responsible:
Martti hamina
Working life cooperation:
-
Other information:
-

521337A: Digital Filters, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Hannuksela, Jari Samuli

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay521337A Digital Filters (OPEN UNI) 5.0 op

ECTS Credits:
5
Language of instruction:
Finnish, English study material available
Timing:
Spring, period 5-6.
Learning outcomes:
Upon completing the required coursework, the student is able to specify and design respective frequency selective FIR and IIR filters using the most common methods. He is also able to solve for the impulse and frequency responses of FIR and IIR filters given as difference equations, transfer functions, or realization diagrams, and can present analyses of the aliasing and imaging effects based on the responses of the filters. Moreover, the student is able to explain the impacts of finite word length in filter design. After the course the student has the necessary basic skills to use signal processing tools available in Matlab environment and to judge the results.

Contents:
1. Sampling theorem, aliasing and imaging, 2. Discrete Fourier transform, 3. Z-transform and frequency response, 4. Correlation and convolution, 5. Digital filter design, 6. FIR filter design and realizations, 7. IIR filter design and realizations, 8. Finite word length effects and analysis, 9. Multi-rate signal processing.

Mode of delivery:
Face-to-face teaching (Lectures), independent work, group work
Learning activities and teaching methods:

Lectures and exercises 50 h. The design exercises familiarize the students with the methods of digital signal processing using the Matlab software package. The rest as independent work.

Target group:
Computer Science and Engineering students and other Students of the University of Oulu.
Prerequisites and co-requisites:
031018P Complex Analysis, 031050A Signal Analysis
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:
Lecture notes and exercise materials. Material is in Finnish and in English. Course book: Ifeachor, E., Jervis, B.: Digital Signal Processing, A Practical Approach, Second Edition, Prentice Hall, 2002.

Assessment methods and criteria:
The course can be passed either with week exams or a final exam. In addition, the exercises need to be returned and accepted.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Jari Hannuksela
Working life cooperation:
None.

Compulsory

521337A-01: Digital filters, partial credit, 0 op

Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Hannuksela, Jari Samuli
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521337A-02: Digital filters, partial credit, 0 op

Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Hannuksela, Jari Samuli
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521467S: Digital Image Processing, 5 op

Voimassaolo: - 31.07.2012
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Pietikäinen, Matti
Opintokohteen kielet: English

Ei opintojaksokuvauksia.

521109A: Electrical Measurement Principles, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Electrical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Juha Saarela
Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
Lectures are in Finnish. Laboratory exercises and exams can be done in English.
Timing:
Periods 1-3.
Learning outcomes:
Upon completion of the course, students are be able to measure basic measurements with a ammeter, voltmeter and oscilloscope. They can operate signal and function generators. They can estimate the validity of their measurements.
Contents:
Units of measures, standards of measures, analysis of errors, most commonly used analog and digital measuring methods, equipment and safety regulations.
Mode of delivery:
Pure face-to-face teaching.
Learning activities and teaching methods:
Lectures 20h and laboratory exercises 16 h, independent work 100 h.
Target group:
Course is compulsory for electrical engineering, information engineering and wellness technology students.
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Ask the person responsible for English material. (Lectures are based on some chapters of book: W.D. Cooper: Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, 1990. English labwork material is available.

Assessment methods and criteria:
Exam and passed lab exercises.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grade is based on exam and grade is on numerical scale 1-5.
Person responsible:
Juha Saarela
Working life cooperation:
-
Other information:
-

761103P: Electricity and Magnetism, 4 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761119P Electromagnetism 1 5.0 op
761119P-01 Electromagnetism 1, lectures and exam 0.0 op
761119P-02 Electromagnetism 1, lab. exercises 0.0 op
761113P-01 Electricity and magnetism, lectures and exam 0.0 op
761113P-02 Electricity and magnetism, lab. exercises 0.0 op
761113P Electricity and magnetism 5.0 op
766319A Electromagnetism 7.0 op

ECTS Credits:
4 credits
Language of instruction:
The lectures will be in Finnish. The textbook is in English and exercises are selected from the textbook. For further information, contact the responsible person of the course.
Timing:
Spring
Learning outcomes:
The student is able to describe the basic concepts of electricity and magnetism and to apply those when solving the problems related to electromagnetism.
Contents:
Electromagnetic interaction is one of the four fundamental interactions in physics and many phenomena like light, radio waves, electric current, magnetism and formation of solid matter are based on electromagnetism. The current technological development is largely based on applications of electromagnetism in energy production and transfer, telecommunications and information technology.
Contents in brief: Coulomb's law. Electric field and potential. Gauss's law. Capacitors and dielectrics. Electric current, resistors, electromotive force and DC circuits. Magnetic field, motion of a charged particle in electric and magnetic fields, and applications. Ampère's law and Biot-Savart law. Electromagnetic induction and Faraday's law. Inductance and inductors. R-L-C circuits, alternating current and AC circuits.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 h, 6 exercises (12 h), self-study 63 h
Target group:
For the students of the University of Oulu.
Prerequisites and co-requisites:
Knowledge of vector calculus and basics of differential and integral calculus are needed.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2012, chapters 21-31. Also older editions can be used.
Lecture material: Finnish lecture material will be available on the web page of the course.
Course material availability can be checked here.
Assessment methods and criteria:
Four mini examinations and end examination or final examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Anita Aikio
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761103P/

521141P: Elementary Programming, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Riekki, Jukka Pekka

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay521141P Elementary Programming (OPEN UNI) 5.0 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5
Language of instruction:
Finnish, the course can be completed in English by answering the lecture questions and doing the programming exercises and the final exercise.
Timing:
Fall, periods 1-3.
Learning outcomes:
Upon completing the required coursework, the student is able to explain the basic programming concepts and structures and to solve problems using these concepts and structures. Moreover, the student is able to implement small programs independently.
Contents:
Basic concepts of programming, basic structures of programming languages, solving problems by programming.
Mode of delivery:
Web-based teaching + face-to-face teaching
Learning activities and teaching methods:
Study materials web. 20 h lectures with intergrated exercises; in addition, appr. 10 h voluntary guided practising, the rest as independent work.
Target group:
1 st year students of computer science and engineering and electrical engineering and other Students of the University of Oulu.
Prerequisites and co-requisites:
None.
Recommended optional programme components:
The course provides a basis for subsequent programming courses.
Recommended or required reading:
Will be announced at the beginning of the course.
Assessment methods and criteria:
Students answer questions after each lecture and do the programming exercises and the final exercise. Assessment is based on these three elements; passing the course requires points from each element. More detailed information on assessment can be found from http://www.oulu.fi/cse/studying/courses.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Jukka Riekki
Working life cooperation:
-

521142A: Embedded Systems Programming, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Riekki, Jukka Pekka

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5
Language of instruction:
Finnish, the course can be completed in English by answering the lecture questions and by doing the laboratory exercise, the programming exercises and the final exercise.
Timing:
Spring, periods 4-6.
Learning outcomes:
Upon completing the required coursework, the student is able to implement small C programs both in Unix environment and for embedded systems with memory-mapped I/O. Moreover, the student is able to recognize how embedded systems programming differs from programming general-purpose computers.
Contents:
Basics of C, bitwise operations, memory management, memory-mapped I/O devices, hardware registers, interrupts, compiling and linking.
Mode of delivery:
Web-based teaching + face-to-face teaching
Learning activities and teaching methods:
20 h lectures, 3 h laboratory exercise; 10-20 h voluntary guided practising, the rest as independent work alone and in the two-person groups.
Target group:
1st year students of computer science and engineering and electrical engineering and other Students of the University of Oulu.
Prerequisites and co-requisites:
The following courses must be completed prior to applying for the course: 521141P Elementary programming.
Recommended optional programme components:
The course “521267A Computer Engineering” is recommended to be completed simultaneously.
Recommended or required reading:
Will be announced at the beginning of the course.
Assessment methods and criteria:
Students answer questions after each lecture, participate the laboratory exercise, and do the programming exercises and the final exercise. Assessment is based on these three elements; passing the course requires points from each element. More detailed information on assessment can be found from http://www.oulu.fi/cse/studying/courses.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Jukka Riekki
Working life cooperation:
-

555364S: Ergonomics, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Seppo Väyrynen

Opintokohteen kielet: Finnish

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5 ECTS credits.
Language of instruction:
Finnish.
Timing:
The course unit is held in the autumn semester, during Periods 1-3.
Learning outcomes:

After the completion of the course students are able to design artefacts in human-centred way, further they can analyze and evaluate human factors and the interaction of humans and production system. They can choose and apply the methods which will enhance the users' / employees' productivity, safety, health, and well-being. They can innovate, develop and design products and production system according to physical, cognitive and organizational ergonomics. They know the basics of international standards of this field.

Contents:
The fundamental principles of ergonomics and its applications. The anthropometrics, biomechanics, work physiology, cognitive psychology, organisational and participative approaches, gerontechnology, design for all, inclusive design. The principles of human-centred design and measurements, CAD, simulation, user study, usability study, industrial cases. Usability of products and usability within work system are the main goal of ergonomic design.

Mode of delivery:
Face-to-face teaching, blended teaching.

Learning activities and teaching methods:
Lectures 26 h. The rest of learning comprises teaching without guidance either privately or in a group. The exercises, including a seminar, are mainly completed as group work.

Target group:
-

Prerequisites and co-requisites:
-

Recommended optional programme components:
555260P Introduction to occupational safety and well-being at work; 555262A Usability and Safety in Product Development.

Recommended or required reading:
Väyrynen, S., Nevala, N. & Päivinen, M. (2004) Ergonomia ja käytettävyys suunnittelussa, Teknologiateollisuus ry. 336 S. ISBN: 978-0-8493-7306-0 (sid.), 0-8493-7306-9-(sid.); SFS-ergonomiastandardit (EN-ISO, www.sfs.fi); www.ttl.fi/fi/ergonomia; SFS-Käsikirja 48-1: Esteettömyys. Osa 1: Johdanto ja periaatteet tuotteiden, palveluiden ja ympäristöjen suunnitteluun. 2010; Bridger, R. (2009). Introduction to ergonomics. 3rd edition. CRC Press.

Assessment methods and criteria:
Exam and exercises from which only the main ones are compulsory.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5

Person responsible:
Professor Seppo Väyrynen and Tatu Prykäri.

Working life cooperation:
-

Other information:
-

040408S: Exercise and Work Physiology, 1 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Vuolteenaho, Olli Jaakko Tuomas

Opintokohteen kielet: Finnish

Language of instruction:
Finnish

Timing:
C 3

Learning outcomes:
After completion of the course the student:
- knows the principles and main methods of exercise physiology.
- can evaluate the knowledge and apply it for investigations of clinical physiological problems and mechanisms of diseases.
- can follow and evaluate the development of exercise physiology, as well as maintain and improve knowledge in it
- can apply knowledge in exercise physiology for acquiring, evaluating and reporting scientific medical and dental information.

Contents:
1. Physical work capacity
2. Assessment of physical strain
3. The effect of temperature on physiological functions

Learning activities and teaching methods:
Lectures (8 h), a practical (4 h), independent study (18 t)
Recommended or required reading:
Material is provided during the course
Assessment methods and criteria:
Attending the lectures and completing the practical
Read more about assessment criteria at the University of Oulu webpage.
Grading:
No examination. Attending the lectures and practical is compulsory.
Person responsible:
Olli Vuolteenaho (olli.vuolteenaho@oulu.fi) ja Hannu Rintamäki (hannu.rintamaki@ttl.fi)

Other information:
Optional course complementing Physiology for Medical and Dental curricula

764115P: Foundations of cellular biophysics, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

764125P	Foundations of cellular biophysics	5.0 op

ECTS Credits:
4 credits
Language of instruction:
Finnish
Timing:
2nd spring
Learning outcomes:
After finishing the course the student is able to describe the foundations or basics of cellular structure and function, to present the biophysical background for some of these, and to solve simple problems and calculations concerning cellular biophysics and -chemistry. In addition, the student can specify and categorize some of the central fields of cell biology and cellular biophysics.
Contents:
In this course cellular function is considered from the point of view of biophysics. The course concentrates on the subjects of energy metabolism, information transfer, and the cellular structures and features that are biophysically interesting. The course contains, for instance, the introduction to the physical chemistry of the cells, the structure of cell and cell membrane (some basic cell biology), cellular energy sources and metabolism, cellular trafficking, kinetics of enzyme reactions, basics of cell membrane function and transportation phenomena, some introduction into the electrical phenomena of the cell membrane and the basics of cellular information processing.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 22 h, calculation exercises 9 h, weekly assignments, self-study 76 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Introduction to biophysics (764103P) is recommended to be done before this course.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:

Lecture handouts; P.J. Antikainen, Biotieteiden fysikaalista kemiaa, WSOY, Helsinki 1981 (partly); J. Heino and M. Vuento, Solubiologia, WSOY, Porvoo 2002 (partly). Since the books are in Finnish, some corresponding literature can be discussed upon with the lecturer.
Course material availability can be checked here.
Assessment methods and criteria:
Home exam, final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Marja Hyvönen, Kyösti Heimonen
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764115P/

040108A: General Pathology, 3,5 - 5 op

Voimassaolo: 01.08.2014 -

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Karttunen, Tuomo Juhani

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
2 nd year, autumn (C3/DC3)
Learning outcomes:
Upon completion the student should know the basic mechanisms of diseases (etiology and pathogenesis), their basic morphological, functional and clinical characteristics, and terminology related with diseases. The student should be able to recognize the most common macroscopical and microscopical features of diseases and be able to reason the relationship between these features of the diseases and their symptoms and other clinical manifestations.

Contents:
Cellular adaptation; cell and tissue injury; genetic and environmental causes of diseases; infections and immunological mechanisms in disease; inflammation; healing; disorders of fluid balance and circulation; basic pathology of neoplastic diseases; basics of medical post-mortem investigation.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures 23 hours, practicals 33 hours. Self study. Written examination 3 hours.
Target group:
Medical and dental students.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
The course has to be completed during preclinical period of medical and dental studies.
Recommended or required reading:
Books: Underwood JCE: General and systematic pathology (5 th ed. 2009 or 4 th ed. 2004; sections: Basic pathology and General disease mechanisms); or Kumar V. et al.: Robbins Basic Pathology, (8 th ed. 2007). Alternatives: Kumar V. et al.: Robbins and Cotran, Pathologic basis of disease (8 th ed. 2010 or 7 th ed. 2005); Rubin & Strayer; Rubin's Pathology (2005). In Finnish: Mäkinen M. et al. Patologia, Duodecim, 2012; Lecture handouts; Guidebook for microscopy practicals; Guidebook for autopsy practicals.
Web-based material (in Finnish): target=_blank>http://www.medicine.oulu.fi/pato/opetus/YP_ATK_JOHDANTO.htm

Assessment methods and criteria:
The course requirements include participation in the compulsory practicals and passing in the end-of-course examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The evaluation scale is 1-5/fail.
Person responsible:
Professor Tuomo Karttunen
Working life cooperation:
No.

040404A: Health technology and rehabilitation, 5 op

Voimassaolo: 01.08.2008 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Open University, Oulu
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay040404A	Health technology and rehabilitation (OPEN UNI)	5.0 op

Ei opintojaksokuvauksia.

811338A: Internet and Computer Networks, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Information Processing Science
Arvostelu: 1 - 5, pass, fail
Opettajat: Juha Kortelainen
Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits/134 hours of work

Language of instruction:
Finnish
Timing:
1 st year, spring semester, period 3
Learning outcomes:
The student is able to describe the functioning of a computer network and how data is transmitted in a network, to list the distinct layers of a network (in two reference models), to estimate the significance and operation of distinct layers and to compare connectionless and connection-oriented transport. She/he identifies the most important network protocols and is able to estimate their functions. The student is able to explain the structure of the Internet addressing system and the general principles according to which routing in IP-networks is carried out. She /he is able to calculate values to parameters describing the capacity of the network (transmission rate, traffic intensity, delay, etc.) and to apply the theory in a computer class, for instance, when analysing the network traffic.

Contents:
1. The history and development of Internet and WWW;
2. The basic concepts of computer networks: network devices, physical media, circuit switching, packet switching, delay, loss and throughput, protocols layers and refer-ence models;
3. The functioning of the application layer, network application architectures, commu-nicating processes, transport services;
4. Classical network applications: electronic mail, file transfer, remote login, news-groups;
5. New applications on the Internet: DNS, World Wide Web and HTTP, content distri-bution;

6. Data transmission on the Internet. UDP protocol: connectionless and simple. TCP protocol: connection-oriented and reliable data transfer;
7. Addressing and routing on the Internet, IP protocol;
8. Multimedia: real-time applications, streaming stored audio and video, Internet radio, Internet telephone (VoIP), QoS;
9. Local area networks, multiple access protocols, link-layer addressing, network de-vices, wireless connections;
10. The principles of network security, security in different layers of the network.

Mode of delivery:
Face-to-face teaching, or an alternative way to pass the course (Erasmus students, and some specific cases)
Learning activities and teaching methods:
Lectures 36h, exercises 30h, autonomous work about 68h, or Contact Education, or an alternative way to pass the course (Erasmus students, and some specific cases)
Target group:

Recommended optional programme components:

Recommended or required reading:
Lecture slides (about 250 slides), text book: J. F. Kurose and K. W. Ross, Computer Networking. A Top-Down Approach, 5th Edition, Pearson Education Inc., 2010. ISBN: 978-0-136548-3 and any other material presented in lectures

Assessment methods and criteria:
Assessment methods and criteria: The course is completed and approved the final test and exercises or an alternate way to pass the course (Erasmus students, and some specific cases)
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1 - 5
Person responsible:
Juha Kortelainen
Working life cooperation:
No

580102P: Introduction to Medical and Wellbeing Technology, 5 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS
Language of instruction:
Finnish
Timing:
1st year, autumn
Learning outcomes:
The student can define areas of medical technology and can list technological innovations used in these fields. The student can describe milestones in medical technology from history to present time.
Contents:
Practical examples of medical and wellness technology, introducing terms. Group work based on the material given and presenting the results.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures, demonstrations and excursions. Group work. Final exam.
Target group:
1st year students of Medical and Wellness Technology.

Recommended or required reading:
Given material.
Assessment methods and criteria:
Participating in the contact teaching and group work. Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No

580102P-02: Introduction to Medical and Wellbeing Technology, exam, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
2 credits
Timing:
1st year, autumn
Learning outcomes:
Introductive course to medical and wellness technology studies. After this course the student is introduced to the major subject and orientated to his or her studies. Student has a general overview of the different areas of medical and wellness technology and engineering.
Contents:
Practical examples of medical and wellness technology, introducing terms. Group work based on the material given and presenting the results.
Learning activities and teaching methods:
Lectures, demonstrations and excursions. Group work. Final exam.
Recommended or required reading:
Given material
Assessment methods and criteria:
Participating in the contact teaching and group work. Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä

580102P-01: Introduction to Medical and Wellbeing Technology, lectures, attendance, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
2 credits

Timing:
1st year, autumn
Learning outcomes:
Introductive course to medical and wellness technology studies. After this course the student is introduced to the major subject and orientated to his or her studies. Student has a general overview of the different areas of medical and wellness technology and engineering.
Contents:
Practical examples of medical and wellness technology, introducing terms. Group work based on the material given and presenting the results.
Learning activities and teaching methods:
Lectures, demonstrations and excursions. Group work. Final exam.
Recommended or required reading:
Given material
Assessment methods and criteria:
Participating in the contact teaching and group work. Written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä

080901A: Introduction to Technology in Clinical Medicine, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2nd year, autumn
Learning outcomes:
The student can list technologies in different fields of medical technology, can describe the working principle of these technologies and evaluate the advantages and limitationc of the technologies.

Contents:
Course introduction lectures. Specialists from different clinical areas give lectures and demonstrations, in which main themes and terms of the field are introduced and technical equipment and methods are presented.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Initial exam. Lectures 35 hours, demonstrations 30 hours, written work. Final exam.
Target group:
Students of Medical Technology (medical and wellness technology, biophysis, students of medical technology from faculty of technology)
Recommended or required reading:
Boook of initial exam T. Sora, P. Antikainen, M. Laisalmi, S. Vierula: Sairaanhoidon teknologia, WSOY 2002. The material addressed during the lectures.
Assessment methods and criteria:
Initial exam and written work. Taking part in the lectures and demos. Written final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:

No

080901A-04: Introduction to Technology in Clinical Medicine, Exam, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2nd year, autumn-spring
Learning outcomes:
After this course student is familiar with the different applications of medical technology and engineering that are used in different clinical areas.
Contents:
Course introduction lectures. Specialists from different clinical areas give lectures and demonstrations, in which main themes and terms of the field are introduced and technical equipment and methods are presented.
Learning activities and teaching methods:
Initial exam. Lectures 35 hrs, demonstrations 30 hrs, written work. Final exam.
Assessment methods and criteria:
Initial exam and written work. Taking part in the lectures and demos. Written final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail
Person responsible:
Professor Timo Jämsä

080901A-01: Introduction to Technology in Clinical Medicine, Initial exam, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Intermediate Studies
Laji: Partial credit
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2nd year, autumn-spring
Learning outcomes:
After this course student is familiar with the different applications of medical technology and engineering that are used in different clinical areas.
Contents:
Course introduction lectures. Specialists from different clinical areas give lectures and demonstrations, in which main themes and terms of the field are introduced and technical equipment and methods are presented.
Learning activities and teaching methods:
Initial exam. Lectures 35 hrs, demonstrations 30 hrs, written work. Final exam.
Assessment methods and criteria:
Initial exam and written work. Taking part in the lectures and demos. Written final exam.

Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail
Person responsible:
Professor Timo Jämsä

080901A-02: Introduction to Technology in Clinical Medicine, Lectures and demonstrations, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2nd year, autumn-spring
Learning outcomes:
After this course student is familiar with the different applications of medical technology and engineering that are used in different clinical areas.
Contents:
Course introduction lectures. Specialists from different clinical areas give lectures and demonstrations, in which main themes and terms of the field are introduced and technical equipment and methods are presented.
Learning activities and teaching methods:
Initial exam. Lectures 35 hrs, demonstrations 30 hrs, written work. Final exam.
Assessment methods and criteria:
Initial exam and written work. Taking part in the lectures and demos. Written final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail
Person responsible:
Professor Timo Jämsä

080901A-03: Introduction to Technology in Clinical Medicine, Written assignment, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
Finnish
Timing:
2nd year, autumn-spring
Learning outcomes:
After this course student is familiar with the different applications of medical technology and engineering that are used in different clinical areas.
Contents:

Course introduction lectures. Specialists from different clinical areas give lectures and demonstrations, in which main themes and terms of the field are introduced and technical equipment and methods are presented.
Learning activities and teaching methods:
Initial exam. Lectures 35 hrs, demonstrations 30 hrs, written work. Final exam.
Assessment methods and criteria:
Initial exam and written work. Taking part in the lectures and demos. Written final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or fail
Person responsible:
Professor Timo Jämsä

580101Y: Introduction to University Studies, 2 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
2 ECTS
Language of instruction:
Finnish or English
Timing:
1st year autumn
Learning outcomes:
After to course the student
1. identifies the most important departments, organisations and associations related to studying and knows their function and services
2. identifies the essential features for university studies and study planning in the field of medical and wellness technology
3. identifies one path of studies
4. can compose and define the first personal study plan
Contents:
University studies. University and the learning environment, aims of the studies, structure and content, working methods, service provided for students. How to plan studies and making a personal study plan. Study groups.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Group meetings 15 hours run by the tutors. Writing the personal study plan. No exam.
Target group:
1st year students of Medical and Wellness Technology.
Assessment methods and criteria:
Taking part into group meetings, making a personal study plan.
Grading:
Pass or fail.
Person responsible:
Tutors, study dvisor.
Working life cooperation:
No

580101Y-02: Introduction to University Studies, conversation, 0 op

Voimassaolo: 01.08.2010 -

Opiskelumuoto: General Studies

Laji: Partial credit

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

580101Y-01: Introduction to University Studies, tutorial, 0 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

764103P: Introduction to biophysics, 2 op

Voimassaolo: 01.08.2009 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

764163P-02 Basic biophysics (part 2) 0.0 op
764163P Basic biophysics 5.0 op
764163P-01 Introduction to Biomedical Physics (part 1) 0.0 op

ECTS Credits:
2 credits
Language of instruction:
Finnish
Timing:
1st autumn
Learning outcomes:
Student knows some basics and concepts of certain areas of biophysics and central targets of biophysical research.
Contents:
The course introduces some basic biological processes from biophysics point of view, and describes certain basics of biophysical research.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 14 h, self-study 39 h
Target group:
Mainly students in Physics B.Sc. program. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
No specific prerequisites
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lectures and lecture notes.
Assessment methods and criteria:
Home exam (written essay)
Read more about assessment criteria at the University of Oulu webpage.
Grading:

Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Kyösti Heimonen, Marja Hyvönen
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764103P/

040007Y: Introduction to scientific research, 1,5 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

ECTS Credits:
1,5 ECTS credits
Language of instruction:
Finnish
Timing:
C2
Learning outcomes:
By the end of the course the student will have practiced the following skills:
- understanding scientific research process
- obtaining data
- exploring research methods and analyzing data
- reporting research findings in medical and dental journals

Contents:

Scientific communication, study planning, study designs, analyzing research data and reporting. Special points in medical research: ethics in research, regulations in clinical research and use of animals in scientific research.
Mode of delivery:
Blended teaching
Learning activities and teaching methods:

Lessons 10 h, homework and learning tasks 24 h.
Target group:
First year medical, dental and medical wellness technology students
Prerequisites and co-requisites:
None
Recommended optional programme components:
This course is a part of the studies in research skills.
Assessment methods and criteria:
Participation in the Faculty of Medicine Science Day and completion of homework.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Docent Pentti Nieminen
Working life cooperation:
No
Other information:
This course is a part of the studies in research skills.

040910S: Laboratory Animal Course For Scientists, 6 op

Voimassaolo: - 31.07.2012

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Laboratory Animal Centre
Arvostelu: 1 - 5, pass, fail
Opettajat: Voipio Hanna-marja
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

761121P: Laboratory Exercises in Physics 1, 3 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

761115P	Laboratory Exercises in Physics 1	5.0 op
761118P-01	Mechanics 1, lectures and exam	0.0 op
761115P-02	Laboratory Exercises in Physics 1, laboratory exercises	0.0 op
761115P-01	Laboratory Exercises in Physics 1, lecture and exam	0.0 op
761114P-01	Wave motion and optics, lectures and exam	0.0 op
761113P-01	Electricity and magnetism, lectures and exam	0.0 op

ECTS Credits:
3 credits
Language of instruction:
The lectures and the instruction material will be in Finnish. The laboratory experiments will be made in groups guided either in Finnish or in English.
Timing:
Autumn, spring.
Learning outcomes:
The student can safely make physical measurements, use different measurement tools, read different scales, handle the data, calculate the error estimations and make a sensible report of his laboratopy measurements.
Contents:
The skill to make laboratory measurements is important for physicists. This is an introductory course how to make physical measurements and how to treat the measured data. Laboratory works are made in groups. The laboratory security is an essential part also in physics. Measurements are made with different instruments. As a result the most probable value is determined as well as its error. The skills obtained during this course can be applied in the other laboratory courses Laboratory exercises in physics 2 and 3.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 12 h, exercises 20 h (5 x 4 h). Five different works will be made during the course in groups. Self-study 48 h.
Target group:
No specific target qroup
Prerequisites and co-requisites:
No specific prerequisites
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
A booklet: Fysiikan laboratoriotyöt I, laboratoriotöiden työohje. Course material is in Finnish. A few English material is available in teaching laboratory.
Assessment methods and criteria:
Written reports of the experiments and one written examination.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Kari Kaila
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/761121P/
Registration for the course and exams will be found by using the code 761121P-01

521466S: Machine Vision, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Heikkilä, Janne Tapani

Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
In Finnish.
Timing:
Spring, periods 5-6.
Learning outcomes:
Upon completion of the course, the student can utilize common machine vision methods for various image analysis problems. He is able to carry out region segmentation and pattern recognition using color, texture and shape descriptors computed from images. He can use motion information in image analysis and model matching in image registration and object recognition. The student can explain the basics of geometric computer vision and is able to calibrate cameras as well as to obtain 3D coordinate measurements from the scene using for example stereo imaging. After the course the student has the rudimentary skills to use the Matlab environment and its tools for implementing machine vision methods and analyzing the results.
Contents:
1. Introduction, 2. Imaging and image representation, 3. Binary image analysis, 4. Pattern recognition concepts, 5. Color and shading, 6. Texture, 7. Content-based image retrieval, 8. Motion from 2D image sequences, 9. Image segmentation, 10. Matching in 2D, 11. Perceiving 3D from 2D images, 12. 3D models and matching.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures (30 h), exercises (15 h) and Matlab design exercise (10 h). The rest as independent work.
Target group:
Computer Science and Engineering students and other Students of the University of Oulu.
Prerequisites and co-requisites:
521467A Digital Image Processing.
Recommended optional programme components:
521497S Pattern Recognition and Neural Networks. This course provides complementary information on pattern recognition and classification applied in machine vision. It is recommended to be studied simultaneously.
Recommended or required reading:
Shapiro L.G., Stockham G.C.: Computer vision, Prentice Hall, 2001. Lecture notes, exercise material. All course material is in English.
Assessment methods and criteria:
The course is passed with final exam and accepted Matlab exercise.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Janne Heikkilä
Working life cooperation:
No.

Compulsory

521466S-01: Machine Vision, Exam, 0 op

Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Heikkilä, Janne Tapani
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

521466S-02: Machine Vision, Exercise work, 0 op

Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Heikkilä, Janne Tapani
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

031019P: Matrix Algebra, 3,5 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Mathematics Division
Arvostelu: 1 - 5, pass, fail
Opettajat: Matti Peltola
Opintokohteen kielet: Finnish
Leikkaavuudet:

031078P Matrix Algebra 5.0 op

ECTS Credits:
3,5
Language of instruction:
Finnish
Timing:
Autumn semester, periods 1-3
Learning outcomes:
After completing the course the student is able to apply arithmetic operations of matrices. He can solve system of linear equations by matrix methods and can apply iterative methods to find the solution of the system of linear equations. The student is able to recognise the vector space and can relate the consepts of linear transform and matrix. He can analyse matrices by the parameters, vectors and vector spaces of matrices. The student is able to diagonalize matrices and apply diagonalization to the simple applications.
Contents:
Vectors and matrices. Systems of linear equations. Vector spaces and linear transformations. The rank, nullity, row space and the column space of a matrix. The determinant of a matrix. Eigenvalues and eigenvectors of a matrix. The diagonalization with applications. The iterative methods of solving linear system of equations. The theorems of Gershgorin and Cayley- Hamilton.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 40 h / Group work 20 h.
Target group:

-
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Grossman, S.I. : Elementary Linear Algebra, David C. Lay: Linear Algebra and Its Applications.
Assessment methods and criteria:
Intermediate exams or a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.
Person responsible:
Matti Peltola
Working life cooperation:
-
Other information:
-

580211S: Maturity Test, 0 op

Voimassaolo: 01.08.2003 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
0 ECTS
Language of instruction:
Finnish or Swedish.
Timing:
After completion of the Pro Gradu.
Learning outcomes:
The student can produce mature text in popular form of the research field and thus show ones familiarity to the field.
Contents:
Depends on the topic of the thesis.
Mode of delivery:
Literary work.
Learning activities and teaching methods:
Takes place after master's thesis. Written based on a given topic considering the thesis.
Target group:
Marter Students of Medical and Wellness Technology.
Recommended optional programme components:
Will be written after the Master's Thesis has been submitted for a review.
Assessment methods and criteria:
The contents will be assessed by the professor of the department. If the student has not made the maturity test as part of the bachelor degree, the language will be assessed by a language consultant.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
If the student has not made the maturity test as part of bachelor's degree, the maturity test also presents the language skills in Finnish or Swedish.

580211A: Maturity Test, 0 op

Voimassaolo: 01.08.2008 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
0 ECTS
Language of instruction:
Finnish or Swedish.
Timing:
After completion of the bachelor's thesis.
Learning outcomes:
The student can produce mature text in popular form of the research field and thus show ones familiarity to the field.
Contents:
Depends on the topic of the thesis.
Mode of delivery:
Literary work.
Learning activities and teaching methods:
Takes place after bachelor's thesis. Written based on a given topic considering the thesis.
Target group:
Bachelor Students of Medical and Wellness Technology
Recommended optional programme components:
Will be written after the Bachelor's Thesis has been submitted for review.
Assessment methods and criteria:
The contents will be assessed by the professor of the department, and the language will be assessed by a language consultant.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä

040902Y: Medical Biochemistry and molecular biology, 8 - 9 op

Opiskelumuoto: General Studies
Laji: Course
Arvostelu: 1 - 5, pass, fail
Opettajat: Karppinen, Peppi Leena Elina
Opintokohteen kielet: Finnish

ECTS Credits:
8 ECTS / 212 hours of work
Language of instruction:
Finnish
Timing:
The course unit is held in the spring semester.
Learning outcomes:
Aim of this course is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of chemistry, molecular biology and common methodology used in molecular biology.

Contents:
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; prostaglandins; thromboxanes; leukotrienes; regulation of gene expression; recombinant DNA technology; stem cells; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; components and function of extracellular matrix.
Mode of delivery:
Lectures, tutorial teaching, laboratpry work, web-based teaching, exams.
Learning activities and teaching methods:
Lectures 94 h, exams.
Target group:
Students of Medical and Wellness Technology.
Recommended or required reading:
Murray, R.K. (ed.): Harper's Illustrated Biochemistry, 28th edition, 2009.
Assessment methods and criteria:
Medical biochemistry and molecular biology course includes 3 different intermediate exams which will be graded (4 essays, 0-2.5 p/essay, points needed for passing 4.75).
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The course unit utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Professor Johanna Myllyharju
Working life cooperation:
No
Other information:
Check the correct amount of ECTS credits for courses that have empty box on the scheluding tab. This depends on the year you began your studies. You can find this from Weboodi "Course Catalogues" - "General Information" page. Enrolment year 2013 mark the credits as follows: 040902Y Medical Biochemistry and molecular biology 9 ECTS cr

040002Y: Medical cell and developmental biology, 7 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Tuukkanen, Kaarlo Juha Kullervo

Opintokohteen kielet: Finnish

ECTS Credits:
7credit points
Timing:
C1
Learning outcomes:
The learning outcomes are to identify the structure of various cell types (especially mammalian cells), the structure and function of cell organelles, cell growth and cell division and the principles of the regulation of cell function, genetic regulation and the common research techniques in cell biology. The student should understand gametogenesis, fertilization, embryonal development (0-40days) and its regulation as well as the development of embryonal malformations. The student should also understand the human growth and development. In addition, the student should learn the basic tissues of the human body and the microscopic structure of the tissues for understanding their normal and pathological function.
Contents:
Cell evolution and cell biology, human embryonal development (embryology), basic tissues which make up the organs (histology).
.
Learning activities and teaching methods:
Lectures 54 h and small group exercises 15 h
Recommended or required reading:
A.L. Kierszenbaum: Histology and Cell Biology: an introduction to pathology. Mosby, St Louis, (the latest edition), or J. Heino, M. Vuento: Biokemian ja solubiologian perusteet. WSOY oppimateriaalit, 1. edition (2007)

B. Young, J.S. Lowe, A. Stevens, J.W. Heath: Wheater's Functional Histology, A Text and Colour Atlas. Elsevier, Churchill Livingstone (or similar Atlas of Histology)
T.W. Sadler: Langman's Medical Embryology. Williams&Wilkins co, Baltimore
Additional material among the following books: 1) M. Niemi, K. Väänänen: Ihmisyksilön kehitysbiologia. Kustannus Oy Duodecim, 1993 2) H. Sariola, M. Filander, T. Heino, J. Jernvall, J. Partanen, K. Sainio, M. Salminen, I. Theseleff: Solusta yksilöksi, Kehitysbiologia. Kustannus Oy Duodecim, 2003
Web material:
http://www.solunetti.fi histology, pathology and embryology (partly under construction)
http://www.thieme.com/dyn/ebooklibrary/index.php
many atlas books, free access from the computers in the internet domain of Oulu University. Handouts of the lectures and practicals.

Assessment methods and criteria:
Participation in the small group practicals. The study module includes final examination . Medical cell and developmental biology and histology together with the study module of Anatomy will make the final grade of Anatomy. (See Anatomy study module)
Read more about assessment criteria at the University of Oulu webpage.

Grading:
See Anatomy

Person responsible:
Professor Petri Lehenkari (Professor Juha Tuukkanen, leave of absence)

Other information:
Medical and dental students have the same study module .
The students in Medical and Wellness Technology have the same study module in extent of 5 credit points when participating in the lectures (54 h), one microscopy practical and the examination.

040002Y-01: Medical cell and developmental biology, examination, 0 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: General Studies

Laji: Partial credit

Vastuuyksikkö: Medicine

Arvostelu: 0,0 - 99,9

Opettajat: Tuukkanen, Kaarlo Juha Kullervo

Opintokohteen kielet: Finnish

ECTS Credits:
7credit points

Timing:
C1

Learning outcomes:
The learning outcomes are to identify the structure of various cell types (especially mammalian cells), the structure and function of cell organelles, cell growth and cell division and the principles of the regulation of cell function, genetic regulation and the common research techniques in cell biology. The student should understand gametogenesis, fertilization, embryonal development (0-40days) and its regulation as well as the development of embryonal malformations. The student should also understand the human growth and development. In addition, the student should learn the basic tissues of the human body and the microscopic structure of the tissues for understanding their normal and pathological function.

Contents:
Cell evolution and cell biology, human embryonal development (embryology), basic tissues which make up the organs (histology).
.

Learning activities and teaching methods:
Lectures 54 h and small group exercises 15 h

Recommended or required reading:
A.L. Kierszenbaum: Histology and Cell Biology: an introduction to pathology. Mosby, St Louis, (the latest edition), or J. Heino, M. Vuento: Biokemian ja solubiologian perusteet. WSOY oppimateriaalit, 1. edition (2007)
B. Young, J.S. Lowe, A. Stevens, J.W. Heath: Wheater's Functional Histology, A Text and Colour Atlas. Elsevier, Churchill Livingstone (or similar Atlas of Histology)
T.W. Sadler: Langman's Medical Embryology. Williams&Wilkins co, Baltimore

Additional material among the following books: 1) M. Niemi, K. Väänänen: Ihmisyksilön kehitysbiologia. Kustannus Oy Duodecim, 1993 2) H. Sariola, M. Filander, T. Heino, J. Jernvall, J. Partanen, K. Sainio, M. Salminen, I. Theseleff: Solusta yksilöksi, Kehitysbiologia. Kustannus Oy Duodecim, 2003
Web material:
http://www.solunetti.fi histology, pathology and embryology (partly under construction)
http://www.thieme.com/dyn/ebooklibrary/index.php
many atlas books, free access from the computers in the internet domain of Oulu University. Handouts of the lectures and practicals.

Assessment methods and criteria:

Participation in the small group practicals. The study module includes final examination . Medical cell and developmental biology and histology together with the study module of Anatomy will make the final grade of Anatomy. (See Anatomy study module)
Read more about assessment criteria at the University of Oulu webpage.

Grading:

See Anatomy

Person responsible:

Professor Petri Lehenkari (Professor Juha Tuukkanen, leave of absence)

Other information:

Medical and dental students have the same study module .
The students in Medical and Wellness Technology have the same study module in extent of 5 credit points when participating in the lectures (54 h), one microscopy practical and the examination.

040011Y: Medical informatics, 2 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040011Y-01: Medical informatics, module 1, information and Communication Technology, 0,5 op

Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Paadar, Matti Reino Isak
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040011Y-02: Medical informatics, module 2, literature retrieval, 1 op

Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040011Y-03: Medical informatics, module 3, clinical information systems, 0,5 op

Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

ECTS Credits:
0,5 ECTS credits/16 hours
Language of instruction:
Finnish
Timing:
C5
Learning outcomes:

By the end of the course the student will have practiced the following skills:
- providing clinical knowledge
- using electronic patients information systems
- using health care classification systems
- using workstations and network for clinical work

Contents:
Medical databases, critical appraisal of medical research article, electronic patients records and information systems.
Mode of delivery:
Regular and active participation in the lessons and completion of a practical project.
Learning activities and teaching methods:
Lessons 6 h and completion of a practical project.10 h.
Target group:
Medical students
Prerequisites and co-requisites:
None
Recommended optional programme components:
This course is a part of the studies in research skills.
Recommended or required reading:
The literature will be agreed during the course.
Assessment methods and criteria:
Regular and active participation in the lessons and completion of a practical project.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/Fail
Person responsible:
Docent Pentti Nieminen
Working life cooperation:
No

764634S: Medical physics and imaging, 5 op

Voimassaolo: 01.08.2011 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:

6 credits
Language of instruction:
English
Timing:
4th-5th Autumn
Learning outcomes:
The student is able to define the physical principles on which various medical diagnostic and therapeutic devices are based upon.
Contents:
The course acquaints the students to the basic physics related to imaging modalities and therapeutic systems used in hospitals. Covered topics include e.g. x-ray imaging, computed tomography, magnetic resonance imaging, nuclear medicine, radiation therapy and methods of clinical neurophysiology.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 h, calculus assignments 4 h, demonstrations 6 h, reporting 25 h, self-study 112 h
Target group:
Physics MSc students with biophysics major or/and medical physics minor, biomedical engineering students. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Recommended: physics basic courses and Radiation physics, biology and safety (761116P, 764117P or 764317A).
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Dowsett, Kenny, Johnston: The Physics of Diagnostic Imaging, 2nd ed., Hodder Arnold, 2006.
Webster: Medical instrumentation: application and design, 4th ed, John Wiley & Sons, 2010.
Podgorsak: Radiation Oncology Physics – A handbook for teachers and students, IAEA, 2005 (http://www-pub.iaea.org/mtcd/publications/pdf/pub1196_web.pdf).

Additional literature depending on the lecturers.
Course material availability can be checked here.
Assessment methods and criteria:
One written examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Miika Nieminen
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764634S/

764680S: Neural information processing, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
5 credits
Language of instruction:
English
Timing:
4th autumn
Learning outcomes:
After finishing the course the student is able to describe and explain the basic principles, model and functions in the information processing of neurons, for example: membrane functions of neurons, synaptic functions, neural

signals, neural information. These models and functions enable the student to solve, analyze and calculate problems and exercises concerning this field. In addition the student is able to describe certain special issues of neural information processing, to illustrate biophysical models made of them and solve calculations concerning them.
Contents:
The course introduces the basics of the cellular functions concerning neural information processing, for example: nerve cell membrane phenomena, synaptic functions, neural signals, neuronal information. In addition some special issues of neuronal information processing are dealt with.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures ca. 30 h, calculation exercises 15 h, home exam, self-study 88 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Cell membrane biophysics (764323A or 764623S) is recommended to be done before this course.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lectures and other material given during the course.
Assessment methods and criteria:
Final examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Matti Weckström, Kyösti Heimonen
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764680S/

521497S: Pattern Recognition and Neural Networks, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Tapio Seppänen

Opintokohteen kielet: Finnish

Leikkaavuudet:

521289S	Machine Learning	5.0 op

ECTS Credits:
5
Language of instruction:
Lectures are given in Finnish or in English. Programming exercises and calculation exercises are given in Finnish and English. The examination can be taken in Finnish or English.
Timing:
Spirng, periods 5 and 6.
Learning outcomes:
After completing the course the student can solve basic statistical calculation problems of pattern recognition and design simple optimal classifiers from the basic theory and assess their performance. The student can explain the Bayesian decision theory and apply it to derive minimum error classifiers and minimum cost classifiers. The student can apply the basics of gradient search method to design a linear discriminant function. In addition, (s)he can explain the structure and operating principle of some common neural networks.
Contents:

Introduction. Bayesian decision theory. Discriminant functions. Parametric and non-parametric classification. Feature extraction. Classifier design. Example classifiers. Neural networks like Perceptron and SOM.

Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
Introduction Lecture, Exercises 20 hours (10 times 2 hours), Programming Exercises 16 hours (8 times 2 hours), programming work compulsory, written exam.

Target group:
Computer Science and Engineering students and other Students of the University of Oulu.

Prerequisites and co-requisites:
The mathematical studies of the BSc of computer science and engineering or equivalent studies, programming skills.

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:
Duda RO, Hart PE, Stork DG, Pattern classification, John Wiley & Sons Inc., 2nd edition, 2001. Haykin S, Neural networks, MacMillan College Publishing Company, 1994 (or more recent). Handouts.

Assessment methods and criteria:
Programming work and calculation exercises are supervised by assistants who also check that the task assignments are completed properly. The course has a written exam.
Read more about assessment criteria at the University of Oulu webpage.

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

Person responsible:
Tapio Seppänen

Working life cooperation:
No.

Compulsory

521497S-01: Pattern Recognition and Neural Networks, Exam, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tapio Seppänen
Opintokohteen kielet: English
Leikkaavuudet:

521289S Machine Learning 5.0 op

Ei opintojaksokuvauksia.

521497S-02: Pattern Recognition and Neural Networks; Exercise Work, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Computer Science and Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Tapio Seppänen
Opintokohteen kielet: English
Leikkaavuudet:

521289S Machine Learning 5.0 op

Ei opintojaksokuvauksia.

040112A: Physiology, 15 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

ECTS Credits:
15 ECTS credits /402 hours of work
Language of instruction:
Finnish. Some lectures, a practical and some of the term papers in English.
Timing:
The course unit is held in the autumn semester. The course must completed during the first two years of the Medical School curriculum
Learning outcomes:
After completion of the course the student:
- knows the principles of the function, regulation, and interrelations of the cells, tissues and organ systems of the healthy human being, as required for independent work as a physician or dentist
- can evaluate the knowledge and apply it for investigations of clinical physiological problems and mechanisms of diseases
- can follow and evaluate the development of physiology as a science, and maintain and improve knowledge in it
- can apply knowledge in physiology for acquiring, evaluating and reporting scientific medical and dental information

After reaching the learning aims the student has sufficient knowledge and skills in physiology for studies leading to the degrees of Licenciate of Medicine and Licenciate of Dentistry, and for continuous learning.
Contents:
1. Cell physiology
2. Fundamentals of Biophysics
3. Organ physiology
4. Physiological regulation and integrative physiology
5. Applied physiology
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Guidance and tutorial (3 h), lectures (106 h), practicals (38 h), term paper (2 h), interim and final examinations (8 h), independent study (245 h).
Target group:
Second year medical and dental students.
Prerequisites and co-requisites:
The student should have completed the courses of Anatomy, Cell Biology, and Medical Biochemistry & Molecular Biology.
Recommended optional programme components:
-
Recommended or required reading:
- Ganong's Review of Medical Physiology (most recent edition).
- Practicals Textbook (in Finnish): Fysiologian harjoitustyöt (Oulun yliopiston oppimateriaalia-sarja, Lääketiede D 3, most recent edition).
- Lecture notes can be found in Optima Environment (http://optima.oulu.fi).
The availability of the textbook in the library can be checked here.

Assessment methods and criteria:
At the beginning of the course there is an examination on the subject of the practicals, which has to be passed. In the middle of the course there is an interim examination on the course contents 1-3, and at the end the final examination. The student has to obtain one third of the maximum points to pass these examinations. Detailed requirements can be found during the course period in the document Course Instructions in the Optima Environment (http://optima.oulu.fi).
Read more about assessment criteria at the University of Oulu webpage.

Grading:
The course unit utilizes a numerical grading scale 1-5. Zero stands for a fail.
Person responsible:
Professor Olli Vuolteenaho
Working life cooperation:
No

580121A: Practical training, 1 - 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
1-4 ECTS. Practical tarining can be accepted to elective studies. Maximum is 4 ECTS. One ECTS is equal to three week of training.
Language of instruction:
Finnish or english
Timing:
Master studies, elective course.
Learning outcomes:
The student can undertake tasks in practical working life.
Contents:
Practical training in the field.
Mode of delivery:
Practical training in the field.
Learning activities and teaching methods:
Student find the place for practical training by self and arrange the training together with the contact person.
Target group:
Master Students of Medical and Wellness Technology.
Assessment methods and criteria:
Practical training related to the study area. The student will acquire an agreement with the practical training contact person on the suitability of the proposed training as part of studies. The student will return practical training report and description of training to the depaprtment.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Professor Timo Jämsä
Working life cooperation:
Yes. The purpose of the training is to familiarize the student with the practical working life.
Other information:
Practical Training 2 can be included in the Master's Degree. For more information, please contact assistant Maarit Kangas.

580120A: Practical training 1, 1 - 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
1-4 ECTS. Practical training can be accepted to elective studies. Maximum is 4 ECTS. One ECTS is equal to three week of training.
Language of instruction:
Finnish or English
Timing:
From 1st to 3rd year, elective course
Learning outcomes:
The student can undertake supervised tasks in working life.
Contents:
Practical training in the field.
Mode of delivery:
Practical training in the field.
Learning activities and teaching methods:
The student finds the place for practical training by self and arrages the training together with the contact person.
Target group:
1st- 3rd year students of Medical and Wellness Technology.
Assessment methods and criteria:
Practical training in the field. The student will acquire an agreement with the practical training contact person on the suitability of the proposed tarining as part of studies. The student will return practical training report and description of training to the department.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass of fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
Yes. The purpose of the training is to familiarize the student with the practical working life.
Other information:
Practical Training 1 can be included in the Bachelor's Degree. For more information, please contact assistant Maarit Kangas.

521431A: Principles of Electronics Design, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Electrical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Häkkinen

Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
Finnish.
Timing:
Spring, periods 4-6
Learning outcomes:
On completion of the study module students should be able to analyze and design such electronic building blocks as rectifiers, clamping circuits, amplifiers and CMOS logic elements using diodes, operational amplifiers and MOS and bipolar junction transistors.
Contents:
Analogue and digital circuits, basic amplifier related concepts, operational amplifier, diodes and diode circuits, single stage bipolar and MOS transistor amplifiers, small signal modeling and analyzing ac properties of amplifiers, internal structures of digital circuits (mainly CMOS), MOS/CMOS switch.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 30 h and exercises 20 h.
Target group:

-
Prerequisites and co-requisites:
Circuit Theory I
Recommended optional programme components:
Recommended course Principles of Semiconductor Devices
Recommended or required reading:
Lecture notes, Razavi: Fundamentals of Microelectronics (John Wiley & Sons 2008), chapters 1-8 and 15 partially or Sedra & Smith : Microelectronic Circuits (6th ed.), chapters 1-5 and 14.
Assessment methods and criteria:
Final or 2 mid-term exams.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.
Person responsible:
Juha Häkkinen
Working life cooperation:
-
Other information:
-

580210S: Pro Gradu, 35 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
35 ECTS
Language of instruction:
Finnish or English
Timing:
Master studies
Learning outcomes:
The student can independently solve a research problem, and describe and solve it. The student can report the work in written form according to the scientific report principles.
Contents:
Research project in the field of medical & wellness technology and writing of the thesis.
Mode of delivery:
Independent work.
Learning activities and teaching methods:
Thesis can be made at different research groups of the university or in industry or health care system. The student writes the thesis independently supported by the supervisor. The topic and contents should be discussed with the professor beforehand.
Target group:
Master Students of Medical and Wellness Technology.
Assessment methods and criteria:
Writing the thesis.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The thesis evaluation comittee of the faculty evaluates the thesis based on the reviewers' statement. Grading: 1-5 or fail
Person responsible:
ProfessorTimo Jämsä
Working life cooperation:
No
Other information:
It is recommended that before starting to do the Master's Thesis student has completed about 60 credits from master studies.

080917S: Project in Biomedical Technology, 5 - 10 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish or English
Timing:
Master studies
Learning outcomes:
The student is abel to solve a research problem and report it in writing.
Contents:
Performing a small ressearch project.
Mode of delivery:
Independent work.
Learning activities and teaching methods:
The student participates in a research project within or outside the university. The student prepares a personal project plan according to separate specifications. At the end of the project, the student prepares a written research report and presents it in a seminar.
Target group:
Master Students of Medical and Wellness Technology.
Assessment methods and criteria:
Preparing a project plan, preparing a written report and presenting it in seminar.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
This course is part of the specialization of Biomedical Technology.

080919S: Project in Health Technology, 5 - 10 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish or English
Timing:
Master studies
Learning outcomes:

The student is able to solve a research problem and report it in writing.
Contents:
Performing a small project.
Mode of delivery:
Independent work.
Learning activities and teaching methods:
The student participates in a research project within or outside the university. The student prepares a personal project plan according to separate specifications. At the end of the project, the student prepares a written research report and presents it in a seminar.
Target group:
Master Students of Medical and Wellness Technology.
Assessment methods and criteria:
Preparing a project plan, preparing a written report and presenting it in a seminar.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
This course is a part of the specialization of Health Technology.

080918S: Project in Medical Imaging, 5 - 10 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Institute of Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS
Language of instruction:
Finnish or English
Timing:
Master studies
Learning outcomes:
The student is able to solve a research problem and perort it written.
Contents:
Performing a samlla research project.
Mode of delivery:
Independent work.
Learning activities and teaching methods:
The student participates in a research project within or outside the university. The student prepares a personal project plan according to separate specifications. At the end of the project, the student prepares a written research report and presents it in a seminar.
Target group:
Master Students of Medical and Wellness Technology
Assessment methods and criteria:
Preparing a project plan, preparing a written report and presenting it in a seminar.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:

This course is a part of the specialization of Medical Imaging.

764317A: Radiation physics, biology and safety, 3 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

902006Y: Reading for Academic Purposes, 1,5 op

Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Language Centre
Arvostelu: 1 - 5, pass, fail
Opettajat: Eva Braidwood
Opintokohteen kielet: English
Leikkaavuudet:

ay902006Y Reading for Academic Purposes (OPEN UNI) 1.5 op

Proficiency level:
B2/C1
Status:
This course is compulsory for the students who choose English but are not exempted on the basis of their matriculation exam grade or the exemption exam organized every November. An alternative course is 903007Y German.
Required proficiency level:
Students are expected to have had English as their A1 or A2 language at school or to have acquired equivalent skills.
ECTS Credits:
1.5 ECTS credits (The workload is 40 hours)
Language of instruction:
English
Timing:
The course is held in spring term for 1 st year students of medicine and dentistry, and 2 nd year spring term for wellness technology students.
Learning outcomes:
Having completed the course successfully, students will be able to

- employ appropriate reading strategies (skimming, scanning and strategies of extensive reading) to identify main points, locate information and synthesize knowledge in the academic texts of the student's field of study

- recognize the discipline and genre-specific conventions of scientific texts
- understand distinctive patterns of medical terminology and differences between scientific and informal language

- combine information from various academic sources, creating a synthesis, and summarizing
Contents:
In this course students will become familiar with the structure and language features of scientific articles, they learn the basic patterns of medical terminology and understand the differences between scientific and informal language by reading scientific texts and research articles from their own field (medicine, dentistry, medical technology).
Mode of delivery:

blended teaching: face-to-face teaching combined with online tasks and independent study.
Learning activities and teaching methods:
The classroom teaching and classroom activities comprise about 50% of the total student workload for the course, including mini-lectures, group and teamwork, student presentations. The independent work component comprises online work and independent study in preparation for classroom activities.
Target group:
Students in the degree programs of medicine, dentistry, and medical technology
Prerequisites and co-requisites:
none
Recommended optional programme components:
902007Y Scientific Communication
Recommended or required reading:
Some materials will be provided by the teacher and a copy fee will be charged where applicable. Other materials are available online. Information will be provided at the beginning of the course.
Assessment methods and criteria:
The assessment is based on active participation in classroom work and completion of home assignments and end-of-course test.
Grading:
The evaluation scale is 1-5.
Person responsible:
Eva Braidwood
Working life cooperation:
none
Other information:
Students with the matriculation exam grade *laudatur* or *eximia cum laude approbatur* and those who have graduated from an IB-program will be exempted from the course but can participate voluntarily. For the rest of the students **an exemption exam will be offered on November.**
The exemption exam is voluntary and can be taken only once. Students **sign up for the exam in WebOodi.**
Students not exempted in the above ways are required to participate in the course. Students **sign up for the course in WebOodi.** Information on the time and place of the classes will be provided and WebOodi.

902007Y: Scientific Communication, 1,5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Arvostelu: 1 - 5, pass, fail

Opettajat: Eva Braidwood

Opintokohteen kielet: English

Leikkaavuudet:

ay902007Y	Scientific Communication (OPEN UNI)	1.5 op

Proficiency level:
CEFR B2/C1
Status:
This course is compulsory for Medical Faculty students who have chosen English. An alternative course is 903008Y German.
Required proficiency level:
Students are expected to have had English as their A1 or A2 language at school or to have acquired equivalent skills.
ECTS Credits:
1.5 ECTS credits (The workload is 40 hours)
Language of instruction:
English
Timing:
Students in the degree program of

- medicine: 4th year autumn term
- dentistry: 3rd year spring term
- medical technology: 1st year autumn term

Learning outcomes:
Having completed the course students will be able to
- use the English language for professional and academic communication in their field of study,
- communicate fluently and accurately; express opinions and demonstrate their knowledge of the field specific to their studies,
- summarize texts on professional and academic topics in the target field,
- give a presentation on a professional or academic topic related to their own specialisation.

Students with adequate oral skills, may choose, as an alternative, **a writing course. Having completed this course, students will be able to**
- write a research article that follows the main discourse conventions of the target field,
- use grammatical patterns that are stylistically appropriate for research articles of the target field,
- use general scientific vocabulary and field specific terminology in an idiomatic way,
- create field-specific patterns of text structure,
- develop a systematic argument with supporting detail.

Contents:
In this course students will become familiar with the language features and structure of a scientific presentation; they practice doctor-patient consultation, clinical consultation, medical history-taking and medical reporting.
Mode of delivery:
blended teaching: face-to-face teaching combined with online tasks and independent study.
Learning activities and teaching methods:
The classroom teaching and classroom activities comprise about 30-50% of the total student workload for the course, including lectures, group and teamwork, student presentations. The independent work component comprises online work and independent study in preparation for classroom activities.
Target group:
Students in the degree programs of medicine, dentistry, and wellness technology
Prerequisites and co-requisites:
none
Recommended optional programme components:
902006Y Reading for Academic Purposes
Recommended or required reading:
Some materials will be provided by the teacher and a copy fee will be charged where applicable. Other materials are available online. Information will be provided at the beginning of the course.
Assessment methods and criteria:
Assessment is based on active participation in classroom activities, completion of home assignments and the end-of-course presentations – alternatively, completion of writing assignments.
Grading:
The evaluation scale is 1-5.
Person responsible:
Eva Braidwood
Working life cooperation:
none
Other information:
Medical students **sign up** for the course **in WebOodi (**following the Information session on types and dates of classroom sessions for different groups, after 15 th August). Information on the time and place of the classes will be provided in Optima and WebOodi.
Medical technology and dentistry students sign up at their departments.
Medical students **sign up** for the course **in WebOodi (** following the Information session on types and dates of classroom sessions for different groups, after 15 th August). Information on the time and place of the classes will be provided in Optima and WebOodi.

Medical technology and dentistry students sign up at their departments.

901020Y: Second Official Language (Swedish), 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Language Centre

Opintokohteen kielet: Swedish

Proficiency level:
B1/B2/C1 (ECTS scale)
Status:
This course is compulsory to all students. The language proficiency provided by the course is equivalent to the language proficiency required of a state official with an academic degree working in a bilingual municipality area (Act 424/03 and Decree 481/03).
Required proficiency level:
The required starting proficiency level for students of all faculties is a grade of 7 or higher from the Swedish studies at secondary school (B-syllabus) or matriculation examintation grade A - L, AND a passing grade from the proficiency test held at the beginning of the course unit.
ECTS Credits:
3 ECTS credits (80 h)
Language of instruction:
Swedish
Timing:
3rd year of studies, autumn term. Held every other year, will be organised the next time in autumn 2014.
Learning outcomes:
Upon completion of the course unit the student should have achieved the Swedish language proficiency required in his/her professional work tasks. He/she should be able to manage in typical professional communication situations. The student should be able to understand spoken language of his/her field, use Swedish in various professional situations, read and write texts related to his/her field. He/she should have developed a readiness to improve his/her language proficiency in genuine language use situations.
Contents:
The course unit's communicative exercises (oral and written) aim to develop and deepen the student's professional Swedish skills. The exercises, completed independently, in pairs or in small groups, include situational discussion exercises, reading comprehension exercises involving current texts, special-field-related writing assignments and exercises related to presentation skills.

Mode of delivery:
Contact teaching
Learning activities and teaching methods:
45 x 45 minutes of contact teaching, independent study
Target group:
Students of Medical Technology.

Prerequisites and co-requisites:
See Required Proficiency Level
Recommended optional programme components:
-
Recommended or required reading:
Material subject to a charge will be distributed in class.
Assessment methods and criteria:
The course unit focuses on improving both oral and written language skills and requires active attendance and participation in exercises, which also require preparation time. 100% attendance is required. The course unit tests both oral and written language skills. Students participate in the teaching in either autumn semester or spring semester.

Read more about assessment criteria at the University of Oulu webpage.
Grading:
Oral and written language proficiencies are tested separately and assessed using the so called KORU-criteria (publication of HAMK University of Applied Sciences, 2006). Separate grades will be awarded for the successful completions of both oral and written portions of the course unit: the possible passing grades are satisfactory skills and good skills (see language decree 481/03). The grades are based on continuous assessment and testing.
Person responsible:
Hanna-Leena Ainonen
Working life cooperation:
-
Other information:
-

521124S: Sensors and Measuring Techniques, 5 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Department of Electrical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Matti Kinnunen, Myllylä, Risto Antero
Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
In Finnish. Materials also available in English.

Timing:
Periods 1-2.
Learning outcomes:
After the course the student is capable to explain the operating principles of different sensors and can select a right sensor for each measuring target. He/she is able to quantify the requirements that affect sensor selection as well as recognize and evaluate the uncertainty of a measurement. In addition the student is able to plan and design sensor signal conditioning circuits.
Contents:
Methods for measuring displacement, velocity, acceleration, torque, liquid level, pressure, flow, humidity, sound and temperature. Ultrasound, optical and nuclear measurement techniques and applications, material analyses such as pH measurement and gas concentration, pulp and paper measurements and smart sensors.

Mode of delivery:
Lectures and exercises.
Learning activities and teaching methods:
Lectures and exercises. The course is passed by a final exam.
Target group:
1st year MSc students.
Prerequisites and co-requisites:
Not defined.
Recommended optional programme components:
Not defined.
Recommended or required reading:
H. N. Norton: Handbook of Transducers, Prentice Hall P T R, 1989 or 2002; lecture notes (in Finnish); exercise notes (also in English)
Assessment methods and criteria:
The course is passed by a final exam.

Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Matti Kinnunen
Working life cooperation:
None.
Other information:
None.

031050A: Signal Analysis, 4 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Mathematics Division
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Leikkaavuudet:

031080A Signal Analysis 5.0 op

ECTS Credits:
4
Language of instruction:
Finnish
Timing:
3-4
Learning outcomes:
After the course the student is able to calculate the energy, the power, the convolution and the frequency spectrum of discrete and analog, periodic and non-periodic deterministic signals. The student is able to study the stationarity, the ergodicity, the mutual dependence and the frequency content of random signals by means of the auto- and cross-correlation functions, the covariance function and the power- and cross-power spectral densities. The student is able to explain the mathematical grounds of the most central optimal systems used in signal estimation, and can solve related problems.
Contents:
Signals, classification, frequency. Orthogonal expansions. Fourier analysis, analog and digital signal, fast Fourier transform. Random variable. Random signal. Stationarity, ergodicity, autocorrelation. Power spectral density. Autoregressive, Gaussian and Poisson processes. Signal estimation, orthogonality principle, Yule-Walker equations, Wiener filter. Matched filter.

Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 40 h /Group work 20 h. Homework assignments.
Target group:
-
Prerequisites and co-requisites:
The recommended prerequisite is the completion of the courses 031019P Matrix Algebra, 031021P Probability and Mathematical Statistics, 031018P Complex Analysis.
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes. Proakis, J.G., Manolakis, D.K.: Introduction to Digital Signal Pro-cessing. Shanmugan, K.S., Breipohl, A.M.: Random Signals, Detection, Estimation and Data Analysis.
Assessment methods and criteria:
Intermediate exams or a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.
Person responsible:
Vesa Kotila, Pasi Ruotsalainen
Working life cooperation:
-
Other information:
-

764359A: Spectroscopic methods, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

080915S: Tissue Biomechanics, 5 op

Voimassaolo: 01.08.2012 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: English

ECTS Credits:
4 ECTS
Language of instruction:
English, Finnish if needed
Timing:
Master studies, Autumn
Learning outcomes:
The student can describe the main biomechanical characteristics of biological materials and different tissues as well as their failure mechanisms. The student knows basics of biomechanical modeling of tissues. The student can perform practical biomechanical experiments, analyze measurement data, interpret results, and report them using good scientific reporting practice.
Contents:
Properties of biological materials. Fatique and failure mechanics. Compostition and mechanics of different tissues. Biomechanical modeling of tissues.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures, exercises, independent work, report writing
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, students of medical technology from faculty of technology) and all other who are interested
Prerequisites and co-requisites:
Prerequisite: 761101P Basic Mechanics, 031010P Calculus I. In addition, it is recommended that the following courses have been executed: 040002Y Medical cell and developmental biology, 040112A Physiology, 031017P Differential equations and 031019P Matrix algebra.
Recommended or required reading:
Material given during lectures. Addiotional reading: Lucas, Cooke ja Friis: A primer of biomechanics. Springer, 1998
Assessment methods and criteria:
Accepted exercises, written exam. The exam includes definition and explanation assignments and problems.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5 or failed
Person responsible:
Docent Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of the specialization of Biomedical Technology

764327A: Virtual measurement environments, 5 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuyksikkö: Department of Physics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:

764627S	Virtual measurement environments	5.0 op

ECTS Credits:

5 credits
Language of instruction:
Finnish
Timing:
3rd autumn
Learning outcomes:
The students will learn how to construct sofware environments for measurements and data analysis.
Contents:
The course gives basic skills to use MATLAB and LabView programming environments to construct their own (custom) programs, with which they can both measure and analyze data with the computer.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 10 h, project work about 60 h, self-study 63 h
Target group:
Students in biophysics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
None, but basics of programming principles are useful.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lecture and exercises notes
Assessment methods and criteria:
Project reports
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Matti Weckström, Jouni Takalo
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764327A/

761104P: Wave Motion, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

761310A	Wave motion and optics	5.0 op
761310A-01	Wave motion and optics, lectures and exam	0.0 op
761310A-02	Wave motion and optics, lab. exercises	0.0 op
761114P-01	Wave motion and optics, lectures and exam	0.0 op
761114P-02	Wave motion and optics, lab. exercises	0.0 op
761114P	Wave motion and optics	5.0 op

ECTS Credits:
3 credits
Language of instruction:
Lectures and exercises in Finnish. Material in English.
Timing:
Spring
Learning outcomes:
The student can classify different types of wave motions and can name the characterizing quantities (wavelength, period, wave speed), can apply geometrical optics to simple mirror and lens systems, can explain the meaning of interference and diffraction and their applications, like using interference to determine wavelength of radiation.

Contents:
Basic course on wave motion, and geometric and wave optics.
Wave motion and propagation. Acoustics. Geometric optics: basic principles, mirrors and lenses. Electromagnetic waves. Wave optics: interference, diffraction, and polarization. Optical instruments. Photometry. Laser.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 h, exercises 10 h, self-study 38 h
Target group:
The students of the University of Oulu
Prerequisites and co-requisites:
No specific prerequisites
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Text book: H.D. Young and R.A. Freedman: University physics, Addison-Wesley, 13th edition, 2008. Also earlier editions can be used.
Course material availability can be checked here.
Assessment methods and criteria:
Four mini examinations and one end examination or a final examination
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Sami Heinäsmäki
Working life cooperation:
No work placement period
Other information:
https://noppa.oulu.fi/noppa/kurssi/761104p/etusivu

521114S: Wireless Measurements, 4 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Electrical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Esko Alasaarela

Opintokohteen kielet: Finnish

Leikkaavuudet:

521097S	Wireless Measurements	5.0 op

ECTS Credits:
4
Language of instruction:
In Finnish or in English if two or more foreign students participate.
Timing:
Period 4
Learning outcomes:
Upon completing the course, the student can apply wireless technologies in industrial, traffic, environmental and healthcare measurements. He/she can tell and argument the benefits and challenges of using wireless measurement solutions and is able to apply the most important standards in his/her engineering work. In addition, he/she can use a representing set of industrial and scientific applications of wireless measurements to develop his /her own solutions.
Contents:
Basics of wireless measurement technologies and standards, wireless sensors and sensor networks, wireless industrial measurement and testing applications, wireless measurement applications in traffic, wireless environmental measurements and wireless human health monitoring.
Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
25 h lectures and seminars. The course is lectured intensively within one period. At the end of the period the students prepare presentations about contemporary themes selected by them or proposed by the teacher and give 15-20 minutes presentation to other students in the seminars.
Target group:
Last phase students
Prerequisites and co-requisites:
Basics of measurement technology and electronic measurement technology or equivalent basic knowledge.
Recommended optional programme components:
-

Recommended or required reading:
Lecture notes (in English) prepared by the teacher and contemporary seminar presentations with their source material.
Assessment methods and criteria:
The course is passed with a written final exam (70 %) and a contemporary seminar (30 %)
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Esko Alasaarela
Working life cooperation:
-
Other information:
-

Compulsory

521114S-01: Wireless Measurements, exam, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Electrical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Esko Alasaarela
Opintokohteen kielet: Finnish
Leikkaavuudet:

521097S	Wireless Measurements	5.0 op

Ei opintojaksokuvauksia.

521114S-02: Wireless Measurements, exercise work, 0 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Advanced Studies
Laji: Partial credit
Vastuuyksikkö: Department of Electrical Engineering
Arvostelu: 1 - 5, pass, fail
Opettajat: Esko Alasaarela
Opintokohteen kielet: Finnish
Leikkaavuudet:

521097S	Wireless Measurements	5.0 op

Ei opintojaksokuvauksia.