Opasraportti

LTK - Medical and Wellness Technology (2014 - 2015)

THE DEGREE PROGRAMMES OF MEDICAL AND WELLNESS TECHNOLOGY 2014 - 2015

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.oulu.fi/ltk/haeopiskelijaksi

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 18 ECTS

040012Y Knowledge and Research 10 ECTS

- 040012Y-01 Information and Communication Technology, small group lessons, 0.5 ECTS
- 040012Y-02 Information and Communication Technology, written assignment, 1.5 ECTS
- 040012Y-03 Scientific Communication, theme day, 0.5 ECTS
- 040012Y-04 Scientific Communication, assignments, 4 ECTS
- 040012Y-05 Statistical Methods, written examination, 1.5 ECTS
- 040012Y-06 Statistical Methods, small group lessons, 1 ECTS
- 040012Y-07 Statistical Methods, assignments, 1 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 72,5 ECTS

031010P Calculus I 5 ECTS
031011P Calculus II 6 ECTS
031017P Differential Equations 4 ECTS
031019P Matrix Algebra 3.5 ECTS

040901Y Basic Anatomy 2 ECTS

040902Y Medical Biochemistry and Molecular Biology 9 ECTS

050004Y Chemistry 3 ECTS

750121P Cell biology, 5 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

764162P Basic 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

040012Y-01 Information and Communication Technology, small group lessons, 0.5 ECTS

040012Y-02 Information and Communication Technology, written assignment, 1.5 ECTS

521141P Elementary Programming 5 ECTS

580101Y Introduction to University Studies 1/2 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

040901Y Basic Anatomy 2 ECTS

580101Y Introduction to University Studies 1/2 ECTS

521142A Embedded Systems Programming 5 ECTS

761104P Wave Motion 3 ECTS

761103P Electricity and Magnetism 4 ECTS

764162P Basic biophysics, 3 ECTS

902006Y Reading for Academic Purposes 1.5 ECTS

In total 59.5 ECTS

2. Academic year

080901A Introduction to Technology in Clinical Medicine 6 ECTS

521302A Circuit Theory 1 5 ECTS

521109A Electrical Measurement Principles 5 ECTS

750121P Cell biology, 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)

040012Y-03 Scientific Communication, theme day, 0.5 ECTS

040012Y-04 Scientific Communication, assignments, 4 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 58,5 (+ optional studies) or 61,5 ECTS

3. Academic year

031050A Signal analysis 2/4 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)

031050A Signal analysis 2/4 ECTS

040012Y-05 Statistical Methods, written examination, 1.5 ECTS

040012Y-06 Statistical Methods, small group lessons, 1 ECTS

040012Y-07 Statistical Methods, assignments, 1 ECTS

521337A Digital Filters 5 ECTS

580209A Bachelor’s Thesis 10 ECTS

580211A Maturity Test 0 ECTS

In total 48 or 51 ECTS + optional studies

Optional Studies 11 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

040105Y Basic Epidemiology 1.5 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 4 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:

040012Y-05 Statistical Methods, written examination, 1.5 ECTS

040012Y-06 Statistical Methods, small group lessons, 1 ECTS

040012Y-07 Statistical Methods, assignments, 1 ECTS

040302Y Basic Human Anatomy and Physiology 6 ECTS

080901A Introduction to Technology in Clinical Medicine 6 ECTS

764162P Basic biophysics, 3 ECTS

The following course is required as master phase study path courses:

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 26 ECTS credits)

Biomedical Technology (31 ECTS)

040911S Using animals in research 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)

521467S Digital Image Processing 5 ECTS 1/Autumn

521466S Machine Vision 5 ECTS 1/Spring

521478S Digital video processing 5 ECTS 1/Autumn

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 ECTS 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 23 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

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

Tutkintorakenteet

Bachelor's Degree programme in Medical and Wellness Technology, Bachelor of Health Science (180 ect)

Tutkintorakenteen tila: archived

Lukuvuosi: 2014-15

Lukuvuoden alkamispäivämäärä: 01.08.2014

General studies (18 op)

580101Y: Introduction to University Studies, 2 op
040012Y: Knowledge and Research, 3,5 - 10 op
compuls8
040012Y-01: Information and Communication Technology, small group lessons, 0,5 op
040012Y-02: Information and Communication Technology, written assignment, 1,5 op
040012Y-03: Scientific Communication, theme day, 0,5 op
040012Y-04: Scientific Communication, assignments, 4 op
040012Y-05: Statistical Methods, written examination, 1,5 op
040012Y-06: Statistical Methods, small group lessons, 1 op
040012Y-07: Statistical Methods, assignments, 1 op

902006Y: Reading for Academic Purposes, 1,5 op
902007Y: Scientific Communication, 1,5 op
901020Y: Second Official Language (Swedish), 3 op

Studies in Physics and Chemistry (31 op)

761105P: Atomic and Nuclear Physics, 3 op
761101P: Basic Mechanics, 4 op
761102P: Basic Thermodynamics, 2 op
050004Y: Chemistry, 3 op
761103P: Electricity and Magnetism, 4 op
761121P: Laboratory Exercises in Physics 1, 3 op
040902Y: Medical Biochemistry and molecular biology, 8 - 9 op
761104P: Wave Motion, 3 op

Studies in Mathematics (22.5 op)

031010P: Calculus I, 5 op
031011P: Calculus II, 6 op
031017P: Differential Equations, 4 op
031019P: Matrix Algebra, 3,5 op
031050A: Signal Analysis, 4 op

Studies in Medicine (25.5 op)

For students of Medical and Wellness Technology the extent of the course 040108A General Pathology is 3,5 credits and the course 040901Y Basic Anatomy is 2 credits.

040901Y: Basic Anatomy, 1,5 - 2 op
750121P: Cell biology, 5 op
040108A: General Pathology, 3,5 - 5 op
- *compuls14*
  - 040108A-01: General Pathology, group teaching, 2 - 2,5 op
  - 040108A-02: General Pathology, 0,5 op
  - 040108A-03: General Pathology, exam, 1 - 2 op

040112A: Physiology, 15 op
- *compuls12*
  - 040112A-01: Physiology, small group teaching, 2,5 op
  - 040112A-011: Physiology, biophysics small group teaching, 0,5 op
  - 040112A-021: Physiology, practicals entry examination, 1 op
  - 040112A-02: Physiology, term paper, 2 op
  - 040112A-03: Physiology, mid-term examination, 3 op
  - 040112A-04: Physiology, final examination, 6 op

Basic studies in Engineering (37 op)

555280P: Basic Course of Project Management, 2 op
521302A: Circuit Theory 1, 5 op
521337A: Digital Filters, 5 op
521109A: Electrical Measurement Principles, 5 op
521141P: Elementary Programming, 5 op
521142A: Embedded Systems Programming, 5 op
521431A: Principles of Electronics Design, 5 op
764327A: Virtual measurement environments, 5 op

Studies in Medical Engineering (25 op)

764162P: Basic biophysics, 3 op
041201A: Basics in eHealth, 5 op

764324A: Biophysical laboratory exercises I, 5 op
580102P: Introduction to Medical and Wellbeing Technology, 5 op
080901A: Introduction to Technology in Clinical Medicine, 5 op
761116P: Radiation physics, biology and safety, 3 op

Bachelor's Thesis and Maturity Test (10 op)

580209A: Bachelor's Thesis, 10 op
580211A: Maturity Test, 0 op

Optional studies (vähintään 11 op)

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).

Master's Degree programme in Medical and Wellness Technology, Master of Health Science (120 ect)

Tutkintorakenteen tila: archived

Lukuvuosi: 2014-15

Lukuvuoden alkamispäivämäärä: 01.08.2014

Common studies for all (36 op)

764364A: Analysis and simulation of biosystems, 6 op
764660S: Bioelectronics, 5 op
080914S: Biomedical Engineering and Medical Physics Seminar, 3 op
521107A: Biomedical Instrumentation, 6 op
521273S: Biosignal Processing, 5 op
764634S: Medical physics and imaging, 5 op
521124S: Sensors and Measuring Techniques, 5 op

Advanced Module (28 - 33.5 op)

The student will choose one of the three advanced module shown below

Biomedical Technology

580401A: Basic Biomaterials, 2 op
580402S: Biomedical Imaging Methods, 1 - 5 op
080917S: Project in Biomedical Technology, 5 - 10 op
465075A: Research Techniques for Materials, 3,5 op
761359A: Spectroscopic methods, 5 op
080915S: Tissue Biomechanics, 5 op
040911S: Using animals in research - carrying out procedures, 3 op

Medical Imaging

580402S: Biomedical Imaging Methods, 1 - 5 op
521467S: Digital Image Processing, 5 op
521478S: Digital Video Processing, 4 op
521466S: Machine Vision, 5 op

521497S: Pattern Recognition and Neural Networks, 5 op
080918S: Project in Medical Imaging, 5 - 10 op

Health technology

080916S: Biomechanics of Human Movement, 5 op
521171A: Electronic Measurement Techniques, 6,5 op
555364S: Ergonomics, 5 op
040404A: Health technology and rehabilitation, 5 op
080919S: Project in Health Technology, 5 - 10 op
521114S: Wireless Measurements, 4 op

Master's Thesis and Maturity Test (35 op)

580211S: Maturity Test, 0 op
580210S: Pro Gradu, 35 op

Optional studies (vähintään 23 op)

Optional studies are selected among the intermediate and advanced studies that support the degree (so that the total extent of the degree is at least 120 credits). 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). A list of recommended optional studies for Master's degree is found in the study guide.

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

040105Y: Basic Epidemiology, 1,5 op
580201A: Biomedical Engineering Programming Study, 5 op
580202S: Biomedical Engineering Project, 5 op
521107S: Biomedical Instrumentation, 6 op
764323A: Cell membrane biophysics, 7 op
521259S: Digital Video Processing, 5 op
521337A-02: Digital filters, partial credit, 0 op
521337A-01: Digital filters, partial credit, 0 op
040408S: Exercise and Work Physiology, 1 op
764115P: Foundations of cellular biophysics, 4 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-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-02: Introduction to University Studies, conversation, 0 op
580101Y-01: Introduction to University Studies, tutorial, 0 op
521466S-01: Machine Vision, Exam, 0 op
521466S-02: Machine Vision, Exercise work, 0 op
580213S: Master's Thesis in Biomedical Engineering, 30 op
764680S: Neural information processing, 5 op
521497S-01: Pattern Recognition and Neural Networks, Exam, 0 op
521497S-02: Pattern Recognition and Neural Networks; Exercise Work, 0 op
580121A: Practical training, 1 - 5 op
580120A: Practical training 1, 1 - 5 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

580101Y: Introduction to University Studies, 2 op

Opiskelumuoto: General Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
2 ECTS credit points
Language of instruction:
Finnish or English
Timing:
1 st year autumn
Learning outcomes:
After the 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 ones 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, services 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 hrs run by the tutors. Writing the personal study plan. No exam.
Target group:
1 st 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 advisor
Working life cooperation:
-

040012Y: Knowledge and Research, 3,5 - 10 op

Voimassaolo: 01.08.2013 -

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Pentti Nieminen

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay040012Y Knowledge and Research (OPEN UNI) 3.5 op

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
10 ECTS
Timing:
1 st and 2 nd year
Learning outcomes:
Upon the completion of the studies the student is able to use the available resources of information technology at the University of Oulu, knows how to use the workstations and data communication available in the Medical Faculty independently, is able to utilize the library services and the most commonly used software in their study, and knows the fundamentals of scientific writing.

The student is familiar with the research process and with the characteristics of scientific information including an ability to obtain and process scientific information, and to report and apply the results especially in the fields of medicine, dentistry and health sciences.

The student knows the role of scientific publications, can use and evaluate information sources critically. The student will be able to search research articles using basic literature retrieval methods and to use bibliographic databases available at the Medical Faculty.
Upon the completion of the module the student is able to recognize different study designs and discipline specific research questions. The student knows basic principles in research ethics and good scientific practice.
The student is familiar with statistical computing in the fields of medicine, dentistry and health sciences. Further, the student is able to analyze data with basic statistical methods, use basic statistical significance tests and inference methods, and evaluate critically scientific research reports
Contents:
Information and communication technology:
Workstations, information security and confidentiality, networks, and the software needed in the study.
Guidelines for written assignments and word processing:
Structure of assignments and thesis, reporting of findings, tables and figures, citing and references.
Scientific information:
Principles of scientific research, study planning and study designs, ethics in research, research methods in the main disciplines (clinical medicine, epidemiology, biomedicine and health sciences).
Scientific communication:
Scientific journals, research articles, critical evaluation of research findings, ethics in scientific publication and bibliometrics.
Literature retrieval:
Library information systems, medical and dental publications, scientific online journals, Medline, Medic, CINAHL , Scopus, Cochrane Library, electronic books, reference management software.
Scientific communication, study planning, study designs, analyzing research data and reporting.
Special issues in medical research:
Ethics in research, regulations in clinical research and use of animals in scientific research, research groups.
Statistical methods:
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:
Blended teaching
Learning activities and teaching methods:
1.lkv (6,5 ECTS **):**
040012-01 (0,5 ECTS) Information and Communication Technology, lessons and small group lessons
040012-02 (1,5 ECTS) Information and Communication Technology, written assignment
040012-03 (0,5 ECTS) Scientific Communication, lessons and theme day
040012-04 (4,0 ECTS) Scientific Communication, small group lessons and assignments
2.lkv (3,5 ECTS **):**
040012-05 (1,5 ECTS) Statistical Methods, lessons and written examination
040012-06 (1,0 ECTS) Statistical Methods, small group lessons

040012-07 (1,0 ECTS) Statistical Methods, practical project

Target group:
Medical, dental and medical wellness technology students
Prerequisites and co-requisites:
None
Recommended or required reading:
Material in lessons small group lessons.
Uhari M ja Nieminen P: Epidemiologia ja biostatistiikka. Second Edition. Duodecim, 2012.
Assessment methods and criteria:
Regular and active participation in the small group lessons and completion of practical projects. Written examination.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass/fail
Person responsible:
Senior lecturer Pentti Nieminen
Working life cooperation:
No

compuls8

040012Y-01: Information and Communication Technology, small group lessons, 0,5 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040012Y-02: Information and Communication Technology, written assignment, 1,5 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040012Y-03: Scientific Communication, theme day, 0,5 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040012Y-04: Scientific Communication, assignments, 4 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040012Y-05: Statistical Methods, written examination, 1,5 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay040012Y-05 Statistical Methods, written examination (OPEN UNI) 1.5 op

Ei opintojaksokuvauksia.

040012Y-06: Statistical Methods, small group lessons, 1 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay040012Y-06 Statistical Methods, small group lessons (OPEN UNI) 1.0 op

Ei opintojaksokuvauksia.

040012Y-07: Statistical Methods, assignments, 1 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: General Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay040012Y-07 Statistical Methods, assignments (OPEN UNI) 1.0 op

Ei opintojaksokuvauksia.

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

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

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 an exemption exam. 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
Language of instruction:
English
Timing:
1 st year spring term.
Learning outcomes:
Having completed the course, students will be able to

- understand and master basic medical terminology
- understand the use of appropriate vocabulary and text types in professional communication (with patients and colleagues)
- assess, combine and summarise information from various academic/scientific sources (scientific articles, medical databases and popular texts related to medicine)

Contents:
-
Mode of delivery:
Contact teaching
Learning activities and teaching methods:
-
Target group:
Students in the degree programs of medicine, dentistry, and medical technology
Prerequisites and co-requisites:
-
Recommended optional programme components:
902007Y Scientific Communication
Recommended or required reading:
Specific texts and material prepared by the teacher. Information will be provided at the beginning of the course. Material will be available in Optima during the course.
Assessment methods and criteria:
The course requirements include active participation in classroom work (20hrs) and completion of home assignments (Reading journal and glossary: 20 hrs). Alternatively, an end-of-course examination may be offered. Some course work will be completed online.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
The evaluation scale is 1-5.
Person responsible:
Eva Braidwood
Working life cooperation:
-
Other information:
Students with the matriculation exam grade laudatur or eximia cum laude approbatur are exempted from the course but can participate voluntarily. The same applies to those who have graduated from an IB–program or other English medium secondary education.

For the rest of the students can take an exemption exam in November. The exemption exam is voluntary and can be taken only once. Students sign up for the exam in WebOodi between 1st -15th November.

902007Y: Scientific Communication, 1,5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Eva Braidwood

Opintokohteen kielet: English

Leikkaavuudet:

ay902007Y Scientific Communication (OPEN UNI) 1.5 op

Proficiency level:
B2/C1
Status:
This course is compulsory for the 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
Language of instruction:
English
Timing:
Students in the degree program of
o medicine: 4th year fall term
o dentistry: 3rd year spring term
o wellness technology: 1st year fall term
Learning outcomes:
Having completed the course students will be able to
- use the English language for professional and academic communication in the student's field of study,
- communicate fluently and accurately and 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 relating to the student's field of study.

Students with adequate oral skills previously acquired, 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 the 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:
-
Mode of delivery:
Contact teaching
Learning activities and teaching methods:
-
Target group:
Students in the degree programs of medicine, dentistry, and wellness technology
Prerequisites and co-requisites:
-
Recommended optional programme components:
902006Y Reading for Academic Purposes
Recommended or required reading:
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 presentations given/completion of writing assignments.
Read more about assessment criteria at the University of Oulu webpage.
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 from August 15th.** Information on the time and place of the classes will be provided in Optima and WebOodi.
Wellness 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

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 (2014,2016,2018..).
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 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:
-

761105P: Atomic and Nuclear Physics, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

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 Saana-Maija 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/

761101P: Basic Mechanics, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

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://noppa.oulu.fi/noppa/kurssi/761101P/etusivu

761102P: Basic Thermodynamics, 2 op

Opiskelumuoto: Basic Studies

Laji: Course

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 11-13, 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/

050004Y: Chemistry, 3 op

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

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

761103P: Electricity and Magnetism, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

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/

761121P: Laboratory Exercises in Physics 1, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

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

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

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Faculty of Biochemistry and Molecular Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Karppinen, Peppi Leena Elina

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

761104P: Wave Motion, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

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:
Saana-Maija Huttula
Working life cooperation:
No work placement period
Other information:
https://noppa.oulu.fi/noppa/kurssi/761104p/etusivu

031010P: Calculus I, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

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

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:
-

031017P: Differential Equations, 4 op

Opiskelumuoto: Basic Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Ruotsalainen Keijo

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:
-

031019P: Matrix Algebra, 3,5 op

Opiskelumuoto: Basic Studies

Laji: Course

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:
-

031050A: Signal Analysis, 4 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Kotila, Vesa Iisakki, Pasi Ruotsalainen

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:
-

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

Opiskelumuoto: General Studies

Laji: Course

Vastuuyksikkö: Medicine

Arvostelu: 1 - 5, pass, fail

Opettajat: Katri Veijola

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.

750121P: Cell biology, 5 op

Voimassaolo: - 31.07.2020

Opiskelumuoto: Basic Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Häggman, Hely Margaretha, Kuittinen, Helmi Helena

Opintokohteen kielet: Finnish

ECTS Credits:
5 ECTS credits / 133 hours of work.
Language of instruction:
Finnish.
Timing:
B.Sc. 1 st autumn.
Learning outcomes:

The student is familiar with cellular structure and functioning in plant and animal cells, understands the social structures in multicellular species and knows why and how the genetic organizations (in nucleus, chloroplast and mitochondria) are co-operating, maintaining and regulating the cellular metabolism. Student understands the common origin and evolution of life on planet Earth, and understands the material basis and mechanisms of this continuity.

Contents:
During the recent years especially the development of molecular and microscopic and imaging techniques has increased our knowledge on cells and their social interactions. The structural and functional characteristics of plant and animal cells will be covered as well as the genetic organization maintaining and regulating the system.

Mode of delivery:
Face-to-face teaching.

Learning activities and teaching methods:
72 h lectures, three exams (zoology, botany, genetics). Home essays and internet material.

Target group:
Compulsory to the biology and biochemistry students.

Prerequisites and co-requisites:
Good basics in biology from elementary school.

Recommended optional programme components:
Cell biology is prerequisite for the following courses: Developmental biology-histology lectures and excercises (751367A, 755317A), Animal physiology lectures and exercises (751388A, 755318A), Functional plant biology lectures and exercises (752345A, 756341A), Concepts of genetics (753124P). Course also gives readiness for studies in molecular biology and biochemistry.

Recommended or required reading:
Textbooks Alberts, B. et al. 2008: Molecular Biology of the Cell (5e). Garland Science Publishing, London, 1268 p. ISBN: 0815341067. (Lodish et al. 2008: Molecular Cell Biology (6e). Freeman, New York, 1150 p.). The availability of the literature can be checked from this link.
The availability of the literature can be checked from this link.

Assessment methods and criteria:
Three exams.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
1-5 / Fail. Final grade is average value of the three exams.

Person responsible:
Prof. Seppo Saarela, Prof. Hely Häggman and Dr. Helmi Kuittinen.

Working life cooperation:
No.

Other information:
-

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 25 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: Cross SS: Underwood's Pathology, a clinical approach (6th ed. 2013; sections: Basic pathology and General disease mechanisms); or: Underwood JCE: General and systematic pathology (5 th ed. 2009; sections: Basic pathology and General disease mechanisms); or Kumar V. et al.: Robbins Basic Pathology, (9 th ed. 2013), 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): Please, see Optima

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.

compuls14

040108A-01: General Pathology, group teaching, 2 - 2,5 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Karttunen, Tuomo Juhani
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040108A-02: General Pathology, 0,5 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Karttunen, Tuomo Juhani
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040108A-03: General Pathology, exam, 1 - 2 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Karttunen, Tuomo Juhani
Opintokohteen kielet: Finnish

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:
A
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).
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

compuls12

040112A-01: Physiology, small group teaching, 2,5 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040112A-011: Physiology, biophysics small group teaching, 0,5 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040112A-021: Physiology, practicals entry examination, 1 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040112A-02: Physiology, term paper, 2 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040112A-03: Physiology, mid-term examination, 3 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

040112A-04: Physiology, final examination, 6 op

Voimassaolo: 01.08.2014 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuyksikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Vuolteenaho, Olli Jaakko Tuomas
Opintokohteen kielet: Finnish
Leikkaavuudet:

040102A-10	Final exam	0.0 op

Ei opintojaksokuvauksia.

555280P: Basic Course of Project Management, 2 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuyksikkö: Field of Industrial Engineering and Management
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

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:
-

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.

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:
-

521141P: Elementary Programming, 5 op

Opiskelumuoto: Basic Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Mika Rautiainen

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:
pass7fail.

Person responsible:
Mika Rautiainen
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:
-

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:
-

764327A: Virtual measurement environments, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

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/

764162P: Basic biophysics, 3 op

Opiskelumuoto: Basic Studies

Laji: Course

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:
3 credits
Language of instruction:
Finnish
Timing:
1st spring
Learning outcomes:
Student can describe and explain some basics and concepts of certain areas of biophysics and knows central targets of biophysical research.
Contents:
The course introduces some basic biological processes from biophysics point of view, and describes so called systems thinking, biophysics and its methods, models and system analysis; for example basics of cellular and molecular biophysics, fluid flow phenomena, biomechanics and some other special issues.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
20 h of lectures, 3 weekly assignments, home exam, final exam, 34 h of independent studies
Target group:
Mainly students in Physics B.Sc. program. For the students of the University of Oulu.
Prerequisites and co-requisites:
No special requirements
Recommended optional programme components:

No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lectures, lecture notes. Additional reading: J. Keener, J Sneyd: Mathematical Physiology, Springer, Berlin, 1998
Assessment methods and criteria:
Exam and 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, Matti Weckström
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764162P/

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:
English
Timing:
2 nd year autumn
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 training.
The student can evaluate the societal and economical significance of information and communication technology in healthcare.
Contents:
- terms and concepts
- societal dimensions
- delivery of health services
- electronic patient records
- data transfer within the health care system
- data transfer between the health care professionals and the patients
- remote consultations, radiologypsychiatry
- economical and functional assessment
- remote education
- future visions of health care information systems
-
Mode of delivery:
Web-based teaching
Learning activities and teaching methods:
Interactivity takes place in virtual learning environment Optima. The course consists of video-taped lectures, power point-presentations 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, other degree programs), Students of Health Sciences and information technology and everyone who is interested.
Recommended or required reading:

All recommended or required reading are offered in Optima virtual learning environment

Assessment methods and criteria:
Web tasks, essay and final exam.
Grading:
1-5
Person responsible:
Professor Jarmo Reponen
Other information:
Recommended literature
Graig J Wootton R, Patterson V (Eds): An introduction to Telemedicine,RSM Press 2006
Saranto K, Korpela M (toim) Tietotekniikka ja tiedonhallinta sosiaali- ja terveydenhuollossa, WSOY, Porvoo-Helsinki-Juva 1999
Hämäläinen P, Reponen J, Winblad I: eHealth of Finland,, Check point 2008, Report 1/2009 Gummerus. Jyväskylä 2009
(http://www.thl.fi/thl-client/pdfs/f5ca5a36-f2c6-4e94-ae95-a7b439b1169b
Winblad I, Reponen J, Hämäläinen P, Kangas M: Informaatio- ja ommunikaatioteknologian käyttö Suomen terveydenhuollossa vuonna 2007. Tilanne ja kehityksen suunta (English summary incl). Stakesin raportteja 37/2008, Stakes, Helsinki 2008
http://www.stakes.fi/verkkojulkaisut/raportit/R37-2008-VERKKO.pdf
Journal of Telemedicine and Telecare
In addition: eLibrary in the Optima comprising updating of the topics of the lectures and some selected essays (by permission of the author)

764324A: Biophysical laboratory exercises I, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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

Opiskelumuoto: General Studies

Laji: Course

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

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

Opiskelumuoto: Intermediate Studies

Laji: Course

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, other degree programs)
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
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No

761116P: Radiation physics, biology and safety, 3 op

Voimassaolo: 03.12.2010 -

Opiskelumuoto: Basic Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766116P-01	Radiation physics, biology and safety, exam	0.0 op
766116P	Radiation physics, biology and safety	5.0 op
766116P-02	Radiation physics, biology and safety, laboratory exercises	0.0 op
761117P	Radiation physics	2.0 op
764117P	Physics, Biology and Safety Radiation	3.0 op

ECTS Credits:
3 credits
Language of instruction:
Finnish
Timing:
2nd or 3rd spring
Learning outcomes:
After finishing the course the student is able to describe the physical mechanisms giving rise to different kinds of radiation and explain the essential effects of ionising radiation function on biological organisms. In addition, the student remembers the essential features of radiation safety and laws and regulations (in Finland) concerning this.
Contents:
The topics of the course include the origin of ionizing radiation e.g. as a result of radioactive decay and in nuclear reactions, the interaction between radiation and matter, the detection and measurements of radiation, physical quantities and measuring units related to radiation, radiation in the environment, and examples of utilizing radiation. The biologic effects of radiation and the legislation on radiation safety are also discussed.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 26 h, exercises 8 h, self-study 46 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu. The course is also part of the training of a director in charge of radiation use. The training is organized by the Radiation and Nuclear Safety Authority.
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:
Lecture notes, required law texts (in Finnish)
Assessment methods and criteria:
One written exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Seppo Alanko and Sakari Kellokumpu
Working life cooperation:
No work placement period
Other information:
https://noppa.oulu.fi/noppa/kurssi/761116p/etusivu

580209A: Bachelor's Thesis, 10 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Course

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 at least credits.

580211A: Maturity Test, 0 op

Voimassaolo: 01.08.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

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:
Writing the maturity test.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail. Both the contents and language are assessed.
Person responsible:
Professor Timo Jämsä

764364A: Analysis and simulation of biosystems, 6 op

Opiskelumuoto: Intermediate Studies

Laji: Course

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/

764660S: Bioelectronics, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

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/

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

Opiskelumuoto: Intermediate Studies

Laji: Course

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, other degree programs).

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:
1-5.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
Also for doctoral studies

521107A: Biomedical Instrumentation, 6 op

Voimassaolo: 01.08.2011 - 31.07.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Myllylä, Risto Antero

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.

764634S: Medical physics and imaging, 5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

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/

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.

580401A: Basic Biomaterials, 2 op

Opiskelumuoto: Intermediate Studies

Laji: Course

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.

580402S: Biomedical Imaging Methods, 1 - 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Simo Saarakkala

Opintokohteen kielet: English

ECTS Credits:
1-4 ECTS
Language of instruction:
English
Timing:

Master studies, spring. 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:
Participation in the lectures and demonstrations, study diary. Exercises. Written exam.
The course can be taken as 1, 2 or 4 ECTS.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail (1 or 2 ECTS), 1-5 (4ECTS).
Person responsible:
Associate Professor Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of specialization of Biomedical Technology and Medical imaging.

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

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, project implementation, 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.

465075A: Research Techniques for Materials, 3,5 op

Voimassaolo: - 31.07.2021

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mechanical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Nousiainen, Olli Pekka

Opintokohteen kielet: Finnish

Leikkaavuudet:

465105A	Research techniques for materials	5.0 op

ECTS Credits:
3,5 ects cr
Language of instruction:
Finnish
Timing:
Lectures and demonstrations, period 1.
Learning outcomes:
This course gives an introduction to the broad spectrum of experimental techniques used in materials research, excluding materials testing. The principles, advantages and limitations of the various methods and their field of applications are described.
Learning outcomes: Upon completing of the required coursework, the student can explain the structure, functioning and contrast formation as well as factors affecting the resolution of various metal microscopes. He/she is also able to explain the concepts of the thermal analysis, dilatometry, and magnetic and electrical measurements and list typical applications for these techniques and methods.
Contents:
Optical microscopy; Transmission and scanning electron microscopes; Microanalysis; Quantitative metallography and image analysis; Spectroscopic methods; Thermal, dilatometric,
electric and magnetic methods; Measurement of residual stresses; Demonstrations of some techniques
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures and demonstrations will be held during the 1st period. The final assessment will be in the form of a final exam.
Study material: Lecture notes
Kettunen, P.O.: Elektronimikroskopia I ja II, Otakustantamo: Espoo, 1983
Target group:
-
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:
Lecture notes. Other material will be announced at the beginning of course.

Assessment methods and criteria:
The final assessment will be in the form of a final exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 1-5.

Person responsible:

Olli Nousiainen
Working life cooperation:
-
Other information:
-

761359A: Spectroscopic methods, 5 op

Voimassaolo: 01.08.2009 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

766359A	Spectroscopic methods	7.0 op

ECTS Credits:
5 credits
Language of instruction:
Finnish
Timing:
Every second year (odd year), spring term
Learning outcomes:
After completion, student knows the principles of various spectroscopic methods and what kind of physical /biophysical phenomena can be studied and what kind of information can be obtained with these methods.
Contents:
Basic principles of infrared, mass and NMR spectroscopy and X-ray analytics are introduced
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 46 h, exercises 24 h, self-study 63 h
Target group:
Compulsory for students in biophysics. Recommended for students directing at some of the lines in atomic, molecular and materials physics. 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:
Partly distributed through net, and partly as paper copies during the course.
Assessment methods and criteria:
Two written examinations or one 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/761359A/

080915S: Tissue Biomechanics, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Simo Saarakkala, Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
4 ECTS
Language of instruction:
English
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. Structure. Composition 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, exam.
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, other degree programs) and all other who are interested
Prerequisites and co-requisites:
Prerequisite: 761101P Basic Mechanics, 031010P Calculus I. Basic knowledge on cell biology, anatomy and physiology, differential aquations and matrix algebra.
Recommended or required reading:
Material given during lectures.
Assessment methods and criteria:
Accepted exercises, written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Associate Professor Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of the specialization of Biomedical Technology

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Laboratory Animal Centre

Arvostelu: 1 - 5, pass, fail

Opettajat: Voipio Hanna-marja

Opintokohteen kielet: Finnish

Leikkaavuudet:

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

Ei opintojaksokuvauksia.

580402S: Biomedical Imaging Methods, 1 - 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Simo Saarakkala

Opintokohteen kielet: English

ECTS Credits:
1-4 ECTS
Language of instruction:
English
Timing:
Master studies, spring. 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:
Participation in the lectures and demonstrations, study diary. Exercises. Written exam.
The course can be taken as 1, 2 or 4 ECTS.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Pass or fail (1 or 2 ECTS), 1-5 (4ECTS).
Person responsible:
Associate Professor Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of specialization of Biomedical Technology and Medical imaging.

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.

521478S: Digital Video Processing, 4 op

Voimassaolo: - 31.07.2012

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Department of Computer Science and Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Heikkilä, Janne Tapani

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.

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.

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.

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

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, project implementation, 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.

080916S: Biomechanics of Human Movement, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
3 ECTS
Language of instruction:
English
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, exam.
Target group:
Students of Medical Technology (medical and wellness technology, biophysics, other degree programs 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.
Assessment methods and criteria:
Accepted exercises, written exam.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No
Other information:
This course is a part of the specialization of Health Technology.

521171A: Electronic Measurement Techniques, 6,5 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Department of Electrical Engineering

Arvostelu: 1 - 5, pass, fail

Opettajat: Juha Saarela

Opintokohteen kielet: Finnish

Leikkaavuudet:

521092A	Electronic Measurement Techniques	5.0 op
521430A	Electronic Measurement Techniques	6.0 op

Ei opintojaksokuvauksia.

555364S: Ergonomics, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Industrial Engineering and Management

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:
-

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.

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

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, project implementation, 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.

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:
-

580211S: Maturity Test, 0 op

Voimassaolo: 01.08.2003 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
0 ECTS
Timing:
After completion of Master'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 master's thesis. Written based on a given topic considering the thesis.
Target group:
Master 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:
Student writes an essay in his/her native language about the topic of the Master's thesis to show a good command of the language and the content of the thesis. The abstract of the Master's thesis can be accepted as a maturity test if the student has written a maturity test earlier in Bachelor's degree. If the student's native language or the language of the study programme is another than Finnish or Swedish, the Faculty will define separately the requirements for the maturity test.
Read more about assessment criteria at the University of Oulu webpage.
If the language of the study programme is English, the abstract of the Master's thesis can be accepted as a maturity test if the student has written a maturity test earlier in Bachelor's degree in English. Otherwise the Faculty will define separately the requirements for the maturity test.”
Grading:
Pass or fail. 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.
Person responsible:
Professor Timo Jämsä
Working life cooperation:
No

580210S: Pro Gradu, 35 op

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

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:
1-5
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.

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

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:

During the second year, spring semester (C4)

Learning outcomes:

Upon completion of the course students will understand the basic epidemiologic thinking / basic concepts of epidemiologic methods in medical and health sciences and know the types of epidemiologic studies. They are also able to calculate measures of disease occurrence, use measures of effect to estimate the association between a given exposure and dis-ease and are able to define the concept of confounding and know how to apply it in a given situation.

Contents:

Structure of the Course:

- 1. Introduction to epidemiology; causation
- 2. Measures of disease occurrence and effect
- 3. Types of epidemiologic studies: cohort studies
- 4. Types of epidemiologic studies: case-control studies
- 5. Biases
- 6. Random error and statistical methods
- 7. Analyzing simple epidemiologic data
- 8. Control of confounding in stratified analysis
- 9. Interaction
- 10. Regression models in epidemiology

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:

Face-to-face teaching and independently performed exercise in the Optima environment.

Learning activities and teaching methods:

The course consists of lectures (10 h), two group exercises (3 h each) and one individual exercise (critical evaluation of an article) which is independently performed in the Optima environment.

Target group:

Medical and dental students of the second year.

Prerequisites and co-requisites:

No.

Recommended optional programme components:

Closely linked to the course in biostatistics taught in the same term.

Recommended or required reading:

Required reading: lecture notes and Rothman KJ. Epidemiology: and introduction. 2nd edition. Oxford University Press, New York, 2012.

Assessment methods and criteria:

Participation to the group exercise is mandatory and controlled for. The individual exercise is examined by the teachers. Written final examination.

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

Grading:

The course unit utilizes a numerical grading scale 1-5/fail. At least 10 points are required for passing the examination.

Person responsible:

Professor Jouni Jaakkola.

Working life cooperation:

No.

Other information:

No other information.

580201A: Biomedical Engineering Programming Study, 5 op

Voimassaolo: 01.08.2008 -

Opiskelumuoto: Advanced Studies

Laji: Course

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 teachers of the department.

580202S: Biomedical Engineering Project, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

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

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.

764323A: Cell membrane biophysics, 7 op

Opiskelumuoto: Intermediate Studies

Laji: Course

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/

521259S: Digital Video Processing, 5 op

Voimassaolo: 01.08.2012 -

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:
Finnish.
Timing:
Autumn, periods 2-3.
Learning outcomes:
In this course students become familiar with basics of video processing and communications. The emphasis is in video representation and coding.
After completing the course the student is able to explain the basic formats and representations of digital video signals. He can analyze the frequency properties of video signals as well as the effects of sampling of multi-dimensional signals, and he can specify digital filters for video sampling rate conversions. He is able to model video content by using simple two- and three-dimensional models, and apply certain well-known methods for video motion estimation. The student can explain the essential parts of the techniques used in video coding and the most important properties of common video coding standards. He can also describe the general principles of scalable video coding and error resilient video coding.
Contents:
1. Video formation, 2. Fourier analysis of video signals, 3. Sampling of multi-dimensional signals, 4. Video sampling rate conversion, 5. Video modeling, 6. Motion estimation, 7. Foundations of video coding, 8. Waveform-based coding, 9. Scalable video coding, 10. Video compression standards, 11. Error control in video communications.
Mode of delivery:
Face-to-face teaching.
Learning activities and teaching methods:
Lectures (24 h), exercises (10 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, 521337A Digital Filters.
Recommended optional programme components:
521466S Machine Vision, 521488S Multimedia Systems. These courses provide complementary information on analysis and processing of digital video. The courses are recommended to be studied either in advance or simultaneously.
Recommended or required reading:
Y. Wang, J. Ostermann, Y. Zhang: Video processing and communications, Prentice-Hall, 2002, chapters 1-6, 8, 9, 11, 13, 14. Lecture notes and 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.

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.

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.

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
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/

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

Voimassaolo: 01.08.2010 -

Opiskelumuoto: General Studies

Laji: Partial credit

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

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

Voimassaolo: 01.08.2010 -

Opiskelumuoto: Intermediate Studies

Laji: Partial credit

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

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

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

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-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.

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.

580213S: Master's Thesis in Biomedical Engineering, 30 op

Voimassaolo: 01.08.2013 -
Opiskelumuoto: Advanced Studies
Laji: Diploma thesis
Arvostelu: 1 - 5, pass, fail
Opettajat: Jämsä, Timo Jaakko
Opintokohteen kielet: English

ECTS Credits:
30 ECTS credit points
Language of instruction:

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 Biomedical Engineering/Biomechanics and Imaging.
Assessment methods and criteria:
Writing the thesis.
Grading:
1-5
Person responsible:
Professor Timo Jämsä
Other information:
It is recommenced to have at least 60 credits before starting the thesis work.

764680S: Neural information processing, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

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-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.

580121A: Practical training, 1 - 5 op

Voimassaolo: 01.08.2005 -
Opiskelumuoto: Intermediate Studies
Laji: Practical training
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

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.

764359A: Spectroscopic methods, 5 op

Opiskelumuoto: Intermediate Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Ei opintojaksokuvauksia.