Opasraportti

Master's Programme in Biomedical Engineering: Biomechanics and Imaging (2015 - 2016)

Course Structure Diagram 2015-17

Course	1. autumn	1. spring	2. autumn	2. spring
521149S Computer Vision Methods for Medical and Biomedical Images 5 ECTS	5			
041201A Basics in eHealth 5 ECTS	5			
521124S Sensors and Measuring Techniques 5 ECTS	5			
764634S Medical Physics and Imaging 6 ECTS	6			
080915S Tissue Biomechanics 5 ECTS	5			
764660S Bioelectronics 5 ECTS	5			
521093S Biomedical Instrumentation 5 ECTS	5			

580402S Biomedical Imaging Methods 5 ECTS	5	
080916S Biomechanics of Human Movement 5 ECTS	5	
580121A Practical Training 2-5 ECTS	2-5	
080914S Biomedical Engineering and Medical Physics Seminar 3 ECTS	3	
521273S Biosignal Processing I 5 ECTS	5	
Choose one of the courses: 080917S Project in Biomedical Technology 10 ECTS 080918S Project in Medical Imaging 10 ECTS 080919S Project in Health Technology 10 ECTS	10	
Master's thesis 30 ECTS cr 580213S Master's thesis in Biomedical Engineering 580211S Maturity Test	5	25
Language Studies 2-8 ECTS cr It is possible to include at most 8 ECTS of optional Finnish language studies into a degree. Finnish language studies are recommended, because they help a student to integrate into the Finnish society.		
900017Y Survival Finnish Course	2	
900013Y Beginners' Finnish Course 1	2	

900053Y Beginners' Finnish Course 2	4			
Optional studies	0-2	6-10	2-5	5
Total	**30**	**30**	**30**	**30**

Optional Studies 18-24 ECTS cr

Course ECTS cr Semester

580401A Basic Biomaterials	2	1/Autumn
521337A Digital Filters	5	1/Spring
764664S Analysis and Simulation of Biosystems	6	2/Autumn
521282S Biosignal Processing II	5	spring
521114S Wireless Measurements	5	spring
521289S Machine Learning	5	spring
521466S Machine Vision	5	spring
521259S Digital Video Processing	5	autumn
812671S Usability Testing	5	spring

International Master's Programme in Biomedical Engineering: Biomechanics and Imaging

2 years, 120 ECTS credits

Master's Thesis 30 ECTS cr
Compulsory Studies 66 ECTS cr
Optional Studies 18-24 ECTS cr
Language Studies 2-8 ECTS cr

Compulsory Studies 66 ECTS cr

Tutkintorakenteet

Master's Programme in Biomedical Engineering: Biomechanics and Imaging update

Tutkintorakenteen tila: published

Lukuvuosi: 2015-16

Lukuvuoden alkamispäivämäärä: 01.08.2015

041201A: Basics in eHealth, 5 op
764660S: Bioelectronics, 5 op
080916S: Biomechanics of Human Movement, 5 op
080914S: Biomedical Engineering and Medical Physics Seminar, 3 op
580402S: Biomedical Imaging Methods, 1 - 5 op
521107S: Biomedical Instrumentation, 6 op
521273S: Biosignal Processing I, 5 op
764634S: Medical physics and imaging, 5 op
580121A: Practical training, 1 - 5 op
521124S: Sensors and Measuring Techniques, 5 op
521149S: Special Course in Information Technology, 5 - 8 op
080915S: Tissue Biomechanics, 5 op

Project Work (vähintään 10 op)

Choose one of the courses

080917S Project in Biomedical Technology
080918S Project in Medical Imaging
080919S Project in Health Technology

Biomedical Technology

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

Medical Imaging

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

Health Technology

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

Master's thesis (vähintään 30 op)

580213S: Master's Thesis in Biomedical Engineering, 30 op
580211S: Maturity Test, 0 op

Language Studies (2 - 8 op)

900013Y: Beginners' Finnish Course 1, 3 op
900053Y: Beginners' Finnish Course 2, 5 op
900017Y: Survival Finnish Course, 2 op

Optional Studies (vähintään 18 op)

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuuluvien opintokohteiden kuvaukset

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 credit points / 135 hours of work
Language of instruction:
English
Timing:
2nd 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 economic 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, teleradiology, telepsychiatry
- 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.

Web lectures 15h / Web exam 40h / Written essay 40h / Self-study and participation to web discussion 40h

Target group:

Students of Medical Technology (medical and wellness technology, biomedical engineering, 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, an essay and final exam

Grading:

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

Person responsible:

Professor Jarmo Reponen

Working life cooperation:

No

Other information:

Recommended literature:

Graig J Wootton R, Patterson V (Eds): An introduction to Telemedicine,RSM Press 2006

Hämäläinen P, Reponen J, Winblad I, Kärki J, Laaksonen M, Hyppönen H, Kangas M (2013) eHealth and eWelfare of Finland, Check point 2011. THL Report 5/ 2013. (https://www.julkari.fi/bitstream/handle/10024/104368/URN_ISBN_978-952-245-835-3.pdf?sequence=1)

Saranto K, Korpela M (toim) Tietotekniikka ja tiedonhallinta sosiaali- ja terveydenhuollossa, WSOY, Porvoo-Helsinki-Juva 1999

Winblad I, Reponen J, Hämäläinen P (2012) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2011. Tilanne ja kehityksen suunta. [English summary] THL Raportteja 3/2012. (http://www.julkari.fi/bitstream/handle/10024/80372/825d0af8-f97c-4192-bf5b-ba5e1bf773aa.pdf?sequence=1)

Journals:

Journal of Telemedicine and Telecare

Telemedicine and e-Health

In addition: eLibrary in the Optima comprising updating of the topics of the lectures and some selected essays (by permission of the author)

764660S: Bioelectronics, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Physics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:

5 credits
Language of instruction:
English
Timing:
4th spring
Learning outcomes:
Students have basic skills for understanding and analyzing of electronics and its applications to measurements of living organisms.
Contents:
The course introduces bioelectric recording techniques, electrodes, most commenly used amplifier types, basic signal processing of biosignals, but also concepts related to the origin of bio-potentials and currents and how they are distributed in biological volume conductors.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 24 h, MatLab-based project work 10 h, calculation exercises 15 h, self-study 84 h
Target group:
Primarily for the students of the degree programme in physics. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Physics courses, programming skills.
Recommended optional programme components:
No alternative course units or course units that should be completed simultaneously
Recommended or required reading:
Lectures and lecture notes. Books e.g. Semmlov J, Circuits signals and systems for bioenergetics, Elsevier Academic Press, 2005; Electronic Signal Processing, parts I-IV, The Open University Press, Milton Keynes 1984.
Course material availability can be checked here.
Assessment methods and criteria:
Final exam
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Numerical grading scale 0 – 5, where 0 = fail
Person responsible:
Matti Weckström
Working life cooperation:
No work placement period
Other information:
https://wiki.oulu.fi/display/764660S/

080916S: Biomechanics of Human Movement, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credit points / 135 hours of work.
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 12h / Assignment 54h / Self-study 69h. Final exam.
Target group:
Students of Medical Technology (medical and wellness technology, biomedical engineers, biophysics, other degree programs) and all other who are interested
Prerequisites and co-requisites:
It is recommended to have basic knowledge on anatomy and physiology, sensors and measurement techniques and signal processing.
Recommended or required reading:
Material given during lectures.
Assessment methods and criteria:
Accepted home exercises and assignments, written exam. The exam includes definition and explanation assignments and problems.

Grading:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No
Other information:
This course is a part of the specialization of Health Technology.

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

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
3 ECTS credit points / 81 hours of work
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:
Introduction lectures, presentations and discussion of the latest scientific publications on the basis. Each student will give two presentations and opponed two performances.
Lectures and seminars 16h / Self-study 65h.
Target group:
Students of Medical Technology (medical and wellness technology, biomedical engineering, 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:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No
Other information:
Also for doctoral studies

580402S: Biomedical Imaging Methods, 1 - 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Simo Saarakkala

Opintokohteen kielet: English

ECTS Credits:
1-5 ECTS credit points / 27-135 hours of work.
Language of instruction:
English
Timing:
Master studies, spring. The course is not organized every year.
Learning outcomes:
The student understands and can describe the basic principles and main applications of imaging methods used in biomedical research.
Contents:
Differences between in vivo, ex vivo and in vitro imaging. Light and electron microscopy. Optical projection and coherence tomography. Optical in vivo imaging. Magnetic resonance imaging. Fourier transform infrared imaging spectroscopy. Raman imaging spectroscopy. Micro-computed tomography. Ultrasound imaging. Basics of image analysis and interpretation.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Differences between in vivo, ex vivo and in vitro imaging. Light and electron microscopy. Optical projection and coherence tomography. Optical in vivo imaging. Magnetic resonance imaging. Fourier transform infrared imaging spectroscopy. Raman imaging spectroscopy. Micro-computed tomography. Ultrasound imaging. Basics of image analysis and interpretation.
Target group:
Master Students of Medical and Wellness technology and Biomedical Engineering and all other who are interested 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, 3 or 5 ECTS.

1 ECTS # participation in the lectures
2 ECTS # participation in the lectures and demonstrations
3 ECTS # participation in the lectures and demonstrations + practical assignment
5 ECTS # participation in the lectures and demonstrations + practical assignment and final exam
Grading:
The 1, 2 or 3 ECTS courses utilize verbal grading: pass or fail. The 5 ECTS course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
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.

521107S: Biomedical Instrumentation, 6 op

Voimassaolo: 01.08.2011 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Igor Meglinski

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.

521273S: Biosignal Processing I, 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Tapio Seppänen

Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
English. Examination can be taken in English or Finnish.
Timing:
The course unit is held in the autumn semester, during period II. It is recommended to complete the course at the end of studies.
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. Analysis in time-domain and frequency domain. Nonstationarity. Event detection. Signal characterization.
Mode of delivery:
Face-to-face teaching and guided laboratory work.
Learning activities and teaching methods:
Lectures 10h, Laboratory work 20h, Self-study 20h, written examination.
Target group:
Students interested in biomedical engineering, preferably at their master's level studies.
Computer Science and Engineering students and other Students of the University of Oulu.

Prerequisites and co-requisites:
The mathematic studies of the candidate degree program of computer science and engineering, or equivalent. Programming skills, especially basics of the Matlab. Basic knowledge of digital signal processing.
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 selected chapters of 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

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

ECTS Credits:
6 credits
Language of instruction:
English
Timing:
4th-5th Autumn
Learning outcomes:

The student is able to define the physical principles on which various medical diagnostic and therapeutic devices are based upon.
Contents:
The course acquaints the students to the basic physics related to imaging modalities and therapeutic systems used in hospitals. Covered topics include e.g. x-ray imaging, computed tomography, magnetic resonance imaging, nuclear medicine, radiation therapy and methods of clinical neurophysiology.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 32 h, calculus assignments 4 h, demonstrations 6 h, reporting 25 h, self-study 112 h
Target group:
Physics MSc students with biophysics major or/and medical physics minor, biomedical engineering students. Also for the other students of the University of Oulu.
Prerequisites and co-requisites:
Recommended: physics basic courses and Radiation physics, biology and safety (766116P, 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/

580121A: Practical training, 1 - 5 op

Voimassaolo: 01.08.2005 -

Opiskelumuoto: Intermediate Studies

Laji: Practical training

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
1-5 ECTS credit points. Practical training can be accepted to elective studies. Maximum is 5 ECTS. One ECTS is equal to two 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:
The course utilizes grading: pass or fail.
Person responsible:
University lecturer Riikka Ahola
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.

521124S: Sensors and Measuring Techniques, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Matti Kinnunen, Myllylä, Risto Antero

Opintokohteen kielet: Finnish

ECTS Credits:
5
Language of instruction:
English.

Timing:
Period 1.
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:
Pure face-to-face teaching.
Learning activities and teaching methods:
Lectures 26h, exercises 12h and self-study 100h.
Target group:
4 year students.
Prerequisites and co-requisites:
No.
Recommended optional programme components:
No.
Recommended or required reading:
H. N. Norton: Handbook of Transducers, Prentice Hall P T R, 1989 or 2002; lecture and exercise notes.
Assessment methods and criteria:
The course is passed by a final exam and passed exercises.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
1-5
Person responsible:

Igor Meglinski
Working life cooperation:
No.

521149S: Special Course in Information Technology, 5 - 8 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Arvostelu: 1 - 5, pass, fail

Opettajat: Ojala, Timo Kullervo

Opintokohteen kielet: English

Voidaan suorittaa useasti: Kyllä

ECTS Credits:
5-8
Language of instruction:
English; Finnish when only Finnish-speaking students.
Timing:
Autumn and Spring, periods 1-4.
Learning outcomes:
The learning outcomes are defined based on the course topic.
Contents:
Varies yearly.
Mode of delivery:
Face-to-face teaching, also web-based teaching can be used.
Learning activities and teaching methods:
Lectures, exercises, design exercise, project work and seminars depending on the topic of the year. The implementation of the course will be informed separately. The course can be given several times with different contents during the academic year and it can be included into the degree several times.
Target group:
M.Sc. level students of Computer Science and Engineering; other students are accepted if there is space in the classes.
Prerequisites and co-requisites:
Will be defined based on the contents.
Recommended optional programme components:
No.
Recommended or required reading:
Will be announced at the first lecture
Assessment methods and criteria:
Depends on the working methods.
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:
CSE dept. professors
Working life cooperation:
-

080915S: Tissue Biomechanics, 5 op

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credit points /135 hours of work.
Language of instruction:
English
Timing:
Master studies, Autumn
Learning outcomes:
The student can describe the main biomechanical characteristics of different tissues as well as their failure mechanisms. The student can perform practical biomechanical experiments, analyze measurement data, interpret results, and report them using good scientific reporting practice. The student understand how numerical modeling can be used to solve problems in tissue biomechanics.
Contents:
Introduction to tissue biomechanics. Most important biomechanical parameters and material models. Experimental measurements of biomechanical properties of tissues. Structure, composition and mechanical properties of different tissues. Biomechanical modeling of tissues.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 15h / Exercises 8h / Assignment 8h / Self-study 104h. Final exam.
Target group:
Students of Medical Technology (medical and wellness technology, biomedical engineers, biophysics, other degree programs) and all other who are interested
Prerequisites and co-requisites:
Basic knowledge on cell biology, anatomy and physiology, mechanics differential equations 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:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
Associate Professor Simo Saarakkala
Working life cooperation:
No
Other information:
This course is a part of the specialization of Biomedical Technology

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS credit points / 270 hours of work.
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:
The course utilizes grading: pass or fail.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No
Other information:
This course is part of the specialization of Biomedical Technology.

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS credit points / 270 hours of work.
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:
The course utilizes grading: pass or fail.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No
Other information:
This course is a part of the specialization of Medical Imaging.

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

Voimassaolo: 01.08.2012 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS credit points / 270 hours of work.
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:
The course utilizes grading: pass or fail.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No
Other information:
This course is a part of the specialization of Health Technology.

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

Voimassaolo: 01.08.2013 -

Opiskelumuoto: Advanced Studies

Laji: Diploma thesis

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: English

ECTS Credits:
30 ECTS credit points / 810 hours of work
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:
The course utilizes a numerical grading scale 1-5. In the numerical scale zero stands for a fail.
Person responsible:
University lecturer Riikka Ahola
Other information:
It is recommenced to have at least 60 credits before starting the thesis work.

580211S: Maturity Test, 0 op

Voimassaolo: 01.08.2003 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Health Sciences

Arvostelu: 1 - 5, pass, fail

Opettajat: Jämsä, Timo Jaakko

Opintokohteen kielet: Finnish

ECTS Credits:
0 ECTS
Language of instruction:
Finnish or Swedish / English
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:
Writing the Maturity test or the abstract of the Master’s Thesis in the student’s native language Finnish or Swedish. If the student's native language is another than Finnish or Swedish the Faculty will define separately the requirements for the language test.
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 person responsible. If the student has not made the maturity test as part of the bachelor degree, the language will be assessed by a teacher of the Languages and Communication, University of Oulu Extension School.
Person responsible:
University lecturer Riikka Ahola
Working life cooperation:
No

900013Y: Beginners' Finnish Course 1, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Negotiated Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900013Y Beginners' Finnish Course 1 (OPEN UNI) 2.0 op

Proficiency level:
A1.2
Status:
The course is intended for the international students in every faculty of Oulu University.
Required proficiency level:
A1.1, Completion of the Survival Finnish course (900017Y) or the equivalent language skills.
ECTS Credits:
3 ECTS credits
Language of instruction:
As much Finnish as possible; English will be used as a help language.
Timing:
-
Learning outcomes:
By the end of the course the student can understand and use some familiar and common everyday expressions relating to her/himself and everyday situations. S/he can interact in a simple way provided the other person talks slowly and clearly and is willing to help. The student is able to read short simple texts and messages dealing with familiar topics. S/he also deepens her/his understanding of the Finnish language and communication styles.
Contents:
This is lower elementary course which aims to help students to learn communication skills in ordinary everyday situations. During the course, students broaden their vocabulary and knowledge of grammar and principles of pronunciation. They also practise to understand easy Finnish talk about everyday subjects, and reading and writing short and simple texts/messages.

The topics and communicative situations covered in the course are: talking about oneself, one's family, studies and daily routines, as well as asking about these things from other person, expressing opinions, describing people and things, talking about weather and seasons, the names of the months and colours.

The structures studied are: verb types, basics of the change of the consonants k, p and t in verbs and nouns, the genitive and partitive cases, possessive structure, some declension types for nouns (word types) and the basics of the local cases.
Mode of delivery:
Contact teaching and guided self study
Learning activities and teaching methods:
Lessons 2 times a week (26 h) and guided self study (50 h)
Target group:
International degree and post-graduate degree students and exchange students of the University
Prerequisites and co-requisites:
Completion of the Survival Finnish Course
Recommended optional programme components:
-
Recommended or required reading:
Gehring, S. & Heinzmann, S. Suomen mestari 1 (chapters 3 - 5)
Assessment methods and criteria:
Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading scale is 1-5.
Person responsible:
Anne Koskela

Working life cooperation:
-
Other information:
Sign-up in WebOodi. The course will start right after the Survival Finnish course.

900053Y: Beginners' Finnish Course 2, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Negotiated Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900053Y Beginners' Finnish Course 2 (OPEN UNI) 4.0 op

Proficiency level:
A1.3
Status:
The course is intended for the international students in every faculty of Oulu University.
Required proficiency level:
A1.2, completion of the Beginners' Finnish course 1 (900013Y) or the equivalent language skills.
ECTS Credits:
5 ECTS credits
Language of instruction:
As much Finnish as possible; English will be used as a help language.
Timing:
-
Learning outcomes:
By the end of the course the student can understand and use some very common everyday expressions and sentences. S/he can communicate in easy and routine tasks requiring a simple and direct exchange of information on familiar everyday matters. The student understands different kinds of short texts. S/he can for example locate important information in them. In addition, s/he has acquired more detailed knowledge of the language and culture.
Contents:
This is a post-elementary course. During the course students learn more about communication in ordinary everyday situations in Finnish. They also extend their vocabulary and knowledge of grammar. Students practise understanding simple Finnish talk and short texts.

The topics and communicative situations covered in the course are: asking for and giving directions, asking for help /favours, carrying out transactions in shops and restaurants, talking about the past, asking for and expressing opinions and feelings, accommodation, travelling, vehicles, work, professions, food, drink and parties.

The structures studied are: the local cases, nominative plural (basic form plural), imperfect (past tense of verbs), part of the imperative, more declension types for nouns (word types), more about the change of the consonants k, p and t in verbs and nouns, declension of the demonstrative pronouns and personal pronouns, more about the partitive case, basics of the object cases, postpositions and some sentence types in Finnish.
Mode of delivery:
Contact teaching and guided self study
Learning activities and teaching methods:
Lessons 2 times a week (50 h) and guided self study (75 h)
Target group:
International degree and post-graduate degree students and exchange students of the University
Prerequisites and co-requisites:
Completion of the Beginners' Finnish Course 1
Recommended optional programme components:
-
Recommended or required reading:
Gehring, S. & Heinzmann, S.: **Suomen mestari 1** (kappaleet 6-9)
Assessment methods and criteria:
Regular and active participation in the weekly lessons (twice a week), homework assignments and written midterm and final exams will be observed in assessment.

Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading scale is 1-5.
Person responsible:
Anne Koskela
Working life cooperation:
-
Other information:
Sign-up in WebOodi. The lessons will be held **twice a week** during a 13-week period.

900017Y: Survival Finnish Course, 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Negotiated Education

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900017Y	Survival Finnish Course (OPEN UNI)	2.0 op

Proficiency level:
A1.1
Status:
The course is intended for the international students in every faculty of Oulu University.
Required proficiency level:
No previous Finnish studies.
ECTS Credits:
2 ECTS credits
Language of instruction:
Finnish and English
Timing:
-
Learning outcomes:
By the end of the course the student can understand and use some very common everyday expressions and phrases, and s/he can locate informational content in simple texts and messages. The student also knows the basic characteristics of Finnish language and Finnish communication styles.
Contents:
This is an introductory course which aims to help students to cope with the most common everyday situations in Finnish. During the course, students learn some useful everyday phrases, some general features of the vocabulary and grammar, and the main principles of pronunciation.

The topics and communicative situations covered in the course are: general information about the Finnish language, some politeness phrases (how to greet people, thank and apologize), introducing oneself, giving and asking for basic personal information, numbers, some time expressions (how to tell and ask the time, days of the week, time of day), food, drink and asking about prices.

The structures studied are: personal pronouns and their possessive forms, forming affirmative, negative and interrogative sentences, the conjugation of some verbs, the basics of the partitive singular and some local cases for answering the ‘where'-question.
Mode of delivery:
Multi-modal teaching (Contact teaching, on-line teaching and independent work)
Learning activities and teaching methods:
Lessons 1–2 times a week (12–14 h) and guided self study (36 h)
Target group:
International degree and post-graduate degree students and exchange students of the University
Prerequisites and co-requisites:
-
Recommended optional programme components:
-
Recommended or required reading:

Will be provided during the course.

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.

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

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

-

Other information:

Sign-up in WebOodi.