DEGREE PROGRAMME IN CLINICAL LABORATORY SCIENCE 2010-2011

1. General descriptions

Qualification awarded: Bachelor of Health Sciences, Master of Health Sciences, Licentiate of Health Sciences & Doctor of Health Sciences

Admission requirements: Bioanalythics degree from (post-secondary / polytechnic level)

Educational and professional goals: The educational goals are to educate students:
  - to work independently as an expert in their selected major field
  - to follow-up the development in their field and apply new, appropriate information to their daily work
  - to develop further Clinical laboratory activity and its administration or training on the basis of research
  - to continue with postgraduate studies in Clinical laboratory science

The professional goals are to educate graduates who are experts in planning, development, teaching and administrative positions in the field of health care. With individual minor selection, a student can direct his/her studies so that he/she can become a specialist, an administrator, or a teacher in Clinical laboratory work or Clinical laboratory science, for example.

Access to further studies: After completing the Master's degree, the student is eligible for applying for postgraduate education (licentiate degree, doctoral degree).

Course structure diagram with ECTS credits (60 per year): The Bachelor's degree consists of general studies (orientation and language studies, 52 credits), basic studies (25 cr) and intermediate studies (38 cr) in clinical laboratory science, studies in minor subject(s) and optional studies (55 cr), and a Bachelor's Thesis (10 cr). General studies are same in each programme/major subject. The Master's degree consists of advanced studies in clinical laboratory science (30 cr), studies in minor subject(s) and optional studies (60 cr), and a pro gradu thesis (30 cr). Some studies on Bachelor's level (parts of general studies, basic studies, and optional studies) are compensated for by previous studies, so that the Bachelor's degree can be completed in 1.5-2 years (full-time study).

STUDIES IN BACHELOR'S DEGREE (180 ECTS credits)

113 ECTS credits are replaced with earlier studies with a degree from a University of Applied Sciences and 103 ECTS credits are replaced with earlier studies in Health Science. Studies units marked with * can be replaced with earlier studies with a degree from a University of Applied Sciences.

Bachelor's degree (180 ECTS credits) consists of:

General studies 24-34 ECTS credits
350003Y The Philosophical foundation of scientific research 6.0
350005Y Statistics 6.0
350006Y Informatics of Health Sciences 2.0
350008Y Academic learning skills 3.0
350001Y The higher education system, study planning and tutoring 2.0
350007Y Statistical data processing 5.0
900007Y Basics of written communication* 2.0
900208Y Foreign language* 3.0
900107Y Other domestic language* 3.0
900008Y Elements of oral communication* 2.0
Basic- and subject studies of major subject
351008P Research course* 2.0
351511P Introduction to Clinical Laboratory Science 5.0
040002Y Medical Cell and Development Biology 7.0
352311A Philosophy and Ethics in Clinical Laboratory Science 3.0
35107A Research methods I 4.0
040103A Medical Biochemistry and Molecular Biology 11.0
35232A Basics of clinical Laboratory Investigation 3.0
352114A Bachelor’s thesis and Written maturity 10.0

Minor studies
Optional studies

Master's degree (120 ECTS credits) consists of:
Advanced studies of major subject 60.0
353550S-01 Development of Clinical Laboratory Science 4.0
353550S-02 Optional Advanced Studies in Clinical laboratory science 12.0
353213S Research methods lab II 8.0
353204S Research seminars 6.0
353205S Master's Thesis 30.0

Minor studies
Optional studies

Final examination: Bachelor's thesis (10 cr) Bachelor's degree, pro gradu thesis (30 cr) Master's degree, a written maturity test
Examination and assessment regulations: University of Oulu Rules of procedure; assessment is based on course objectives and detailed assessment criteria.
ECTS-departmental co-ordinator: amanuensis of the Institute of Health Sciences tel. +358 8 537 5601

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

352114A: Bachelor Thesis and Written Maturity Test, 6 op
900008Y: Basics of Oral Communication, 3 op
900007Y: Basics of Written Communication, 2 op
352532A: Basics of clinical laboratory investigation, 3 op
353550S-01: Development of clinical laboratory science, 4 op
352228A: Elective special research course, 3 - 10 op
902008Y: English, 3 op
350006Y: Informatics of health sciences, 4 op
350008Y: Introduction to academic studies, 3 op
351511P: Introduction to clinical laboratory science, 5 op
353206S: Master's thesis and thesis seminars, 30 op
040103A: Medical Biochemistry and Molecular Biology, 14 - 15 op
040103A-05: Medical Biochemistry and Molecular Biology Final exams, 1 op
040103A-01: Medical Biochemistry and Molecular Biology Intermediate exams 1, 3 op
040103A-02: Medical Biochemistry and Molecular Biology Intermediate exams 2, 2 op
040103A-03: Medical Biochemistry and Molecular Biology Intermediate exams 3, 3 op
040103A-04: Medical Biochemistry and Molecular Biology Intermediate exams 4, 3 op
040103A-06: Medical Biochemistry and Molecular Biology Laboratory works, 1,5 op
040103A-07: Medical Biochemistry and Molecular Biology Theme day, 0,5 op
040002Y: Medical cell and developmental biology, 7 op
Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

352114A: Bachelor Thesis and Written Maturity Test, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:
  ay352114A  Bachelor Thesis  6.0 op

ECTS Credits:
10 ECTS

Language of instruction:
Finnish

Timing:
2nd year autumn term

Learning outcomes:
The student gets familiar with scientific writing and principles of scientific research. With this knowledge she/he can do written scientific research based on research literature or empirical data. The student is able to present the research.

Learning activities and teaching methods:
Individual studying.

Recommended optional programme components:
Elementary course in research, Research methods in nursing science I.

Recommended or required reading:
Literature connected to research proposal.

Assessment methods and criteria:
Presentation of own raport. Written maturity test.

Grading:
Pass / Fail

Person responsible:
Doctoral candidate
900008Y: Basics of Oral Communication, 3 op

Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuysikkö: Language Centre
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish
Leikkaavuudet:
  ay900008Y Basics of Oral Communication (OPEN UNI) 3.0 op

Ei opintojaksokuvauksia.

900007Y: Basics of Written Communication, 2 op

Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuysikkö: Language Centre
Arvostelu: 1 - 5, pass, fail
Opettajat: Outi Mikkola
Opintokohteen kielet: Finnish
Leikkaavuudet:
  ay900007Y Basics of Written Communication (OPEN UNI) 2.0 op

Ei opintojaksokuvauksia.

352532A: Basics of clinical laboratory investigation, 3 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Eeva Liikanen
Opintokohteen kielet: Finnish

ECTS Credits:
  3 ECTS
Language of instruction:
  Finnish
Timing:
  1st year spring term not in 2011.
Learning outcomes:
The student evaluates quality of results of laboratory investigations. She/he is able to develop clinical laboratory activity.
Contents:
  Trains of treatment and evidence-based Finnish Current Care guidelines.
Recommended or required reading:
353550S-01: Development of clinical laboratory science, 4 op

Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Eeva Liikanen
Opintokohteen kielet: Finnish

ECTS Credits: 4 ECTS
Language of instruction: Finnish
Timing: 3rd year autumn term
Learning outcomes:
The student evaluates present state of clinical laboratory based on research and theory of science. She/he evaluates significance and state of clinical laboratory science in health care and surrounding society. She/he makes conclusions of future challenges in clinical laboratory science.
Contents:
Definition, development strategies and evaluation of theory. Knowledge and future of clinical laboratory science.
Learning activities and teaching methods:
17 hours of lectures and seminars, 83 hours of independent studies.
Recommended optional programme components:
Full completion of subject studies in clinical laboratory science.
Recommended or required reading:
Assessment methods and criteria:
Activity in seminars, a written essay
Grading:
5-1/fail
Person responsible:
Eeva Liikanen
Other information:
No substitution by earlier studies.

352228A: Elective special research course, 3 - 10 op

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

ECTS Credits: 1-5 credits
Language of instruction: Finnish or English
Timing:
According to a personal study plan.
**Learning outcomes:**
Student has got acquainted with phases of research process and doing research according to a personal study plan.

**Contents:**
According to a personal study plan.

**Learning activities and teaching methods:**
Student plans an individual learning task with the responsible teacher.

**Assessment methods and criteria:**
According to a personal study plan.

**Grading:**
pass-fail

**Person responsible:**
Responsible person of the research project.

**Other information:**
The course suits for bachelor's and master's degree studies as elective studies.

---

**902008Y: English, 3 op**

**Voimassaolo:** 01.08.1995 -

**Opiskelumuoto:** Language and Communication Studies

**Laji:** Course

**Vastuuysikkö:** Language Centre

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

**Opintokohteen kielet:** English

**Leikkaavuudet:**
ay902008Y  Academic English (OPEN UNI)  3.0 op

**ECTS Credits:**
3 credits

**Person responsible:**
Riitta Sallinen

**Other information:**
See description of part 1 (902008Y-01) and part 2 (902008Y-02).

---

**350006Y: Informatics of health sciences, 4 op**

**Opiskelumuoto:** General Studies

**Laji:** Course

**Vastuuysikkö:** Institute of Health Sciences

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

**Opettajat:** Pentti Nieminen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**
2 ECTS

**Language of instruction:**
Finnish

**Timing:**
First year autumn term

**Learning outcomes:**
The student is able to use electronic databases and information services in her/his studies at the University of Oulu.

**Contents:**

**Learning activities and teaching methods:**
Lectures 6 hours, practise 15 hours and self-study.

**Recommended or required reading:**
List given during the course.

**Assessment methods and criteria:**
Written essay, participation in workgroups.

**Grading:**
Pass / failed

---

350008Y: Introduction to academic studies, 3 op

**Voimassaolo:** 01.08.2005 -
**Opiskelumuoto:** General Studies
**Laji:** Course
**Vastuuysikkö:** Institute of Health Sciences
**Arvostelu:** 1 - 5, pass, fail
**Opintokohteen kielet:** Finnish

**ECTS Credits:**
3 ECTS

**Language of instruction:**
Finnish

**Timing:**
1st year autumn term

**Learning outcomes:**
The student is able to assess himself as a student and a member of science community. He becomes conscious of the meaning of learning outcomes in planning his own studies. The student develops the readiness of writing and reading the academic writings. The student understands the ethical principles of students and teachers.

**Contents:**

**Learning activities and teaching methods:**
Lectures, group working, web-based working and individual studying 80h.

**Recommended or required reading:**
Literature and articles, the Ethical Guidelines for Teachers and Students, University of Oulu.

**Assessment methods and criteria:**
Participating in lectures and accomplishing the tasks.

**Grading:**
Pass / Fail

---

351511P: Introduction to clinical laboratory science, 5 op

**Opiskelumuoto:** Basic Studies
**Laji:** Course
**Vastuuysikkö:** Institute of Health Sciences
**Arvostelu:** 1 - 5, pass, fail
**Opettajat:** Eeva Liikanen
**Opintokohteen oppimateriaali:**
Niiniluoto, Ilkka , , 1997, pakollinen
Kiikeri, Mika , , 2004, pakollinen
**Opintokohteen kielet:** Finnish

**ECTS Credits:**
5 ECTS

**Language of instruction:**
Finnish

**Timing:**
1st year autumn term (exception: autumn 2011)

**Learning outcomes:**
The student knows the scientific basis of Clinical laboratory science and its relationship with other sciences. The student evaluates clinical laboratory science as science and discipline.

Contents:
Origin, present and future of clinical laboratory science. Education, research and research subjects in clinical laboratory science.

Learning activities and teaching methods:
Lectures and seminars 20 hours, independent studies 85 hours, e-learning 20 hours.

Recommended or required reading:

Assessment methods and criteria:
Before the lectures, the student will take part to the literature examination: Kiikeri, M. & Ylikoski, P. 2004. Tiede tutkimuskohteena. Filosofinen johdatus tieteen tutkimukseen. Gaudeamus, Tampere.
Activity in e-learning, a written essay.
Grading:
Pass/fail

Person responsible:
Eeva Liikanen

Other information:
No substitution by earlier studies

353206S: Master's thesis and thesis seminars, 30 op

Opiskelumuoto: Advanced Studies
Laji: Diploma thesis
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
30 ECTS
Timing:
3rd year autumn term to 4th year autumn term
Learning outcomes:
The student is able to write the Master's thesis
Learning activities and teaching methods:
Individual study or pair work under supervision of 1-2 teachers. Thesis can be written also as a scientific article.
Recommended optional programme components:
Elementary courses in research, Bachelor's thesis, research methods in nursing science I and II, Research Seminars.
Assessment methods and criteria:
The student writes pro gradu thesis or corresponding work. If the student have not taken part to the written maturity test in context of the Bachelor's thesis, the written maturity have to be performed. Student will get guidance app. three times.
Grading:
1-5

040103A: Medical Biochemistry and Molecular Biology, 14 - 15 op

Opiskelumuoto: Basic Studies
Laji: Course
Vastuuysikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Johanna Myllyharju
Opintokohteen kielet: Finnish
ECTS Credits: 14 ECTS
Timing: C2
Learning outcomes: Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

Contents: Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods: Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.


Assessment methods and criteria: Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p /essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

Grading: 5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

Person responsible: Professor Johanna Myllyharju

040103A-05: Medical Biochemistry and Molecular Biology Final exams, 1 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuysikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Johanna Myllyharju
Opintokohteen kielet: Finnish

ECTS Credits: 14 ECTS
Timing: C2
Learning outcomes: Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

Contents:
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods:
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

Recommended or required reading:


Assessment methods and criteria:
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p/essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

Grading:
5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

Person responsible:
Professor Johanna Myllyharju

040103A-01: Medical Biochemistry and Molecular Biology Intermediate exams 1, 3 op

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuysikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Johanna Myllyharju
Opintokohteen kielet: Finnish

ECTS Credits:
14 ECTS
Timing: C2
Learning outcomes:
Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

Contents:
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods:
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

**Recommended or required reading:**


**Assessment methods and criteria:**
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p/essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

**Grading:**
5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

**Person responsible:**
Professor Johanna Myllyharju

**040103A-02: Medical Biochemistry and Molecular Biology Intermediate exams 2, 2 op**

Voimassaolo: 01.08.2010 -
Opiskelumuoto: Basic Studies
Laji: Partial credit
Vastuuysikkö: Medicine
Arvostelu: 0,0 - 99,9
Opettajat: Johanna Myllyharju
Opintokohteen kielet: Finnish

**ECTS Credits:**
14 ECTS

**Timing:**
C2

**Learning outcomes:**
Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

**Contents:**
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

**Learning activities and teaching methods:**
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

**Recommended or required reading:**


**Assessment methods and criteria:**
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p/essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.
**Grading:**

5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

**Person responsible:**
Professor Johanna Myllyharju

---

**040103A-03: Medical Biochemistry and Molecular Biology Intermediate exams 3, 3 op**

**Voimassaolo:** 01.08.2010 -  
**Opiskelumuoto:** Basic Studies  
**Laji:** Partial credit  
**Vastuuysikkö:** Medicine  
**Arvostelu:** 1 - 5, pass, fail  
**Opettajat:** Johanna Myllyharju  
**Opintokohteen kielet:** Finnish

**ECTS Credits:**
14 ECTS

**Timing:**  
C2

**Learning outcomes:**

Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

**Contents:**

Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

**Learning activities and teaching methods:**

Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

**Recommended or required reading:**


**Assessment methods and criteria:**

Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p/essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

**Grading:**

5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

**Person responsible:**
Professor Johanna Myllyharju

---

**040103A-04: Medical Biochemistry and Molecular Biology Intermediate exams 4, 3 op**

**Voimassaolo:** 01.08.2010 -  
**Opiskelumuoto:** Basic Studies
Learning outcomes:
Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

Contents:
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods:
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

Recommended or required reading:


Assessment methods and criteria:
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p /essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

Grading:
5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

Person responsible:
Professor Johanna Myllyharju

040103A-06: Medical Biochemistry and Molecular Biology Laboratory works, 1,5 op
Learning outcomes:
Aim of this module is to learn the function of the cells at the molecular level and recognize the basic biochemical compounds, reactions and the overall regulation of various metabolic pathways, especially those which are meaningful for Medicine. Students will also learn the basics of molecular biology and common methodology used in molecular biology.

Contents:
Structure of carbohydrates, amino acids, lipids and nucleic acids; metabolism of the carbohydrates, amino acids, lipids and nucleic acids; porphyrins and bile pigments; vitamins; minerals; prostaglandins; thromboxanes; leukotrienes; nutrition; DNA synthesis and repair mechanisms; structure of chromosomes and genes; regulation of gene expression; RNA synthesis, species and functions; protein synthesis and genetic code; posttranslational modifications and processing of proteins; recombinant DNA technology; stem cells; oncogenes; growth factors; mitochondrial DNA and diseases; intracellular messengers; energy metabolism; hormones; hypoxia response of the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods:
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

Recommended or required reading:


Assessment methods and criteria:
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p /essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

Grading:
5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

Person responsible:
Professor Johanna Myllyharju
the cells; cell membranes; components and function of extracellular matrix. Laboratory works (5 different works) include basics of enzyme kinetics, mitochondria and oxidative phosphorylation, lipids, carbohydrates and hormonal regulation of lipolysis.

Learning activities and teaching methods:
Lectures 124 h. Laboratory work including tutorial teaching and verbal evaluation, 5 works and 24 h. Theme day containing preliminary preparations 9 h.

Recommended or required reading:


Assessment methods and criteria:
Medical biochemistry and molecular biology course includes 4 different intermediate exams (4 essays, 0-2.5 p /essay, points needed for passing 4.75). Final exam consist of 6 essays (0-10 p/essay). In final exams only 2 essays from 6 can have points lower than 4.5, otherwise exam will be failed. All the intermediate exams and laboratory works should be passed before participation in final exam.

Grading:
5 = 50.75 or more, 4 = 44.75-50.5, 3 = 38.75-44.5, 2 = 32.75-38.5, 1 = 27.75-32.5.

Person responsible:
Professor Johanna Myllyharju

040002Y: Medical cell and developmental biology, 7 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuysikkö: Medicine
Arvostelu: 1 - 5, pass, fail
Opettajat: Tuukkanen, Kaarlo Juha Kullervo
Opintokohteen kielet: Finnish

ECTS Credits:
7credit points
Timing:
C1

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

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

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

Recommended or required reading:
T.W. Sadler: Langman’s Medical Embryology. Williams&Wilkins co, Baltimore
many atlas books, free access from the computers in the internet domain of Oulu University. Handouts of the lectures and practicals.

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

Grading:
See Anatomy

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

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

353550S: Optional advanced studies in clinical laboratory science, 11,5 op

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

ECTS Credits:
11,5 ECTS

Language of instruction:
Finnish

Timing:
2nd year autumn and spring term

Learning outcomes:
The student evaluates current research in clinical laboratory science and makes conclusions.

Contents:
According to student's choice, studies in clinical laboratory science and/or laboratory medicine (Faculty of Medicine, other faculties or other universities. Student plans her/his studies (supervisor's approval needed).

Learning activities and teaching methods:
Lectures, seminars, independent studies and/or training 300 hours.

Recommended optional programme components:
Full completion of subject studies in clinical laboratory science.

Recommended or required reading:
Current Papers

Assessment methods and criteria:
A written essay

Grading:
5-1/ fail

Person responsible:
Eeva Liikanen

350003Y: Philosophical foundations for scientific research, 5 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuyksikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen oppimateriaali:
Philosophical foundations for scientific research (OPEN UNI)  5.0 op

ECTS Credits: 6 ECTS 
Language of instruction: Finnish 
Timing: 1st year autumn 
Learning outcomes: Upon completion the student know the most important traditions of philosophy, and their background, knows the philosophical principle of theory development in order to understand scientific methodological studies later.


Learning activities and teaching methods: Lectures, 20 hour and two books.

Recommended or required reading: Lectures and two books of following:
- Sajama, Seppo. 1993. Arkipäivän filosofiaa. Hygieia, Helsinki. and one of following

You can check the literature availability at this link.

Assessment methods and criteria: Examination of lectures and literature.

Grading: Pass / Fail

Person responsible: Lecturer

352311A: Philosophy and ethics in clinical laboratory work, 3 op

Opiskelumuoto: Intermediate Studies 
Laji: Course 
Vastuuysikkö: Institute of Health Sciences 
Arvostelu: 1 - 5, pass, fail 
Opintokohteen kielet: Finnish

ECTS Credits: 3 ECTS 
Language of instruction: Finnish 
Timing: Exception: autumn 2011 
Learning outcomes: The student analyses philosophical and ethical issues of clinical laboratory activity. She/he evaluates her/his own ethical reasoning, gets acquainted practical philosophy theories and is able to analyze ethical problems in clinical laboratory work.


Learning activities and teaching methods: Lectures and seminars 20 hours, independent studies 55 hours

Recommended or required reading:

You can check the literature availability at [this link](#).

**Assessment methods and criteria:**
A written essay.

**Grading:**
5-1/fail

**Person responsible:**
Eeva Liikanen

**Other information:**
No substitution by earlier studies

---

**351513P: Replaced basic studies in clinical laboratory science, 11 op**

**Voimassaolo:** 01.08.2006 -
**Opiskelumuoto:** Basic Studies
**Laji:** Course
**Vastuuysikkö:** Institute of Health Sciences
**Arvostelu:** 1 - 5, pass, fail
**Opettajat:** Eeva Liikanen
**Opintokohteen kiele:** Finnish

**ECTS Credits:**
11 ECTS

---

**352513A: Replaced subject studies in clinical laboratory science, 17 op**

**Voimassaolo:** 01.08.2006 -
**Opiskelumuoto:** Intermediate Studies
**Laji:** Course
**Vastuuysikkö:** Institute of Health Sciences
**Arvostelu:** 1 - 5, pass, fail
**Opettajat:** Eeva Liikanen
**Opintokohteen kiele:** Finnish

**ECTS Credits:**
17 ECTS

---

**351008P: Research methods (basic), 2 op**

**Opiskelumuoto:** Basic Studies
**Laji:** Course
**Vastuuysikkö:** Institute of Health Sciences
**Arvostelu:** 1 - 5, pass, fail
**Opintokohteen oppimateriaali:**
Hirsjärvi, Sirkka , , 2007, pakollinen
**Opintokohteen kiele:** Finnish

**Leikkaavuudet:**
ECTS Credits:
2 ECTS

Language of instruction:
Finnish

Learning outcomes:
The student gets familiar with aims and principles of scientific research and she/he knows the phases of research process.

Contents:
Methodological foundations for scientific research.

Learning activities and teaching methods:
Independent studying

Recommended or required reading:

You can check the literature availability at this link

Assessment methods and criteria:
Exam
Grading:
5-1/ fail

Other information:
The course is substitused to those students who have accomplished the university of applied sciences.

352107A: Research methods I, 6 op

Opiskelumuoto: Intermediate Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen oppimateriaali:
Polit, Denise F., , 2004, pakollinen
Opintokohteen kielet: Finnish
Leikkaavuudet:

ay352107A Research methods I (OPEN UNI) 6.0 op

ECTS Credits:
6 ECTS

Language of instruction:
Finnish

Timing:
1st year spring term

Learning outcomes:
The student gets familiar with methodological issues and the process of scientific research.

Upon completion the student should be able to:
• formulate a research problem and research purpose and design a research
• review and evaluate scientific literature
• design qualitative and quantitative research methods
• know main questions of reliability and validity
• take care of ethical considerations
• know how to write a research proposal

Contents:
The overview of research process, literature reviews, data collection, analysis of research data, reliability, addressing ethical issues, writing a research proposal.

Learning activities and teaching methods:
Lectures and practice 30 hours, independent studying and exam 130 hours.
**Recommended optional programme components:**
Research methods (basic).
If the student has studied Research methods I in another context, e.g. Health administration science, Student has to study course 352224A Nursing Science - Health Care System.

**Recommended or required reading:**
Topical scientific articles.

You can check the availability of literature at [this link](#).

**Assessment methods and criteria:**
Participation in exercises, working groups and exam.

**Grading:**
1-5/fail

**Person responsible:**
Senior lecturers

**Other information:**
No substitution by earlier studies

---

**353203S: Research methods II, 10 op**

**Opiskelumuoto:** Advanced Studies

**Laji:** Course

**Vastuuysikkö:** Institute of Health Sciences

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

**Opettajat:** Tarja Pölkki

**Opintokohteen oppimateriaalit:**
Polit, Denise F., 2004, pakollinen
Paunonen, M. & Vehviläinen-Julkunen, K., 1997, pakollinen
Morse, Janice M., 1995, pakollinen
Janhonen, S & Nikkonen, M., 2003, pakollinen
Karma, Kai, , 1990, pakollinen
Perttula J. & Latomaa T., 2005, pakollinen

**Opintokohteen kielet:** Finnish

**ECTS Credits:**
10 ECTS

**Language of instruction:**
Finnish

**Timing:**
2nd year spring term

**Learning outcomes:**
Upon completion the student should be able to:

- know in deeply the features and methodological issues in quantitative and qualitative research
- know types/designs for nursing research and apply them in own research
- have a good command of the research process as a whole
- assess questions of reliability and validity and apply them in planning and implementing own research
- being aware of main questions of the ethical issues
- write a research proposal and research report

**Contents:**
Methodological issues in quantitative and qualitative research, types/designs for nursing research, phases of research process, reliability and validity assessment, ethical issues. Writing a research proposal and research report.

**Learning activities and teaching methods:**
Lectures and practice 50 hours, group-working 30 hours, independent studying and written essays 190 hours.

**Recommended optional programme components:**
Research methods (basic), research methods I, candidate thesis. No substitution by earlier studies.

**Recommended or required reading:**
Janhonen & Nikkonen (eds.) Laadulliset tutkimusmenetelmät hoitotieteessä. WSOY. Helsinki (in applied parts).
Topical literature and scientific articles.

You can check the literature availability at this link

Assessment methods and criteria:
Participation in exercises, group-working, written essay/examination.
Grading:
5-1/fail
Person responsible:
Senior lectures in nursing science and health administration

353213S: Research methods II, lab, 8 op
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Tarja Pölkki
Opintokohteen kielet: Finnish
Voidaan suorittaa useasti: Kyllä

353204S: Research seminars, 5 - 8 op
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

ECTS Credits:
8 ECTS
Language of instruction:
Finnish
Timing:
3rd year autum and spring term
Learning outcomes:
Student can argue her/his research process. The student writes research proposal.
Contents:
The student participate on three public defence on doctoral thesis, she/he will write (1 page) rapport of each of them. Rapports are given to supervisor of the seminars. The student participates on two research seminars at department. Writing of research proposal.
Learning activities and teaching methods:
Lectures 30 hours.
Recommended optional programme components:
Finished courses: Candidate thesis, Research course and Research methods I and II.
Recommended or required reading:
Literature connected to research proposal.
Assessment methods and criteria:
Research proposal. Writing of three rapports of public defense. The participation of seminars.
Grading:
Pass / Fail
Person responsible:
Lecturer

901007Y: Second Official Language (Swedish), 3 op
Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuysikkö: Language Centre
Opintokohteen kielet: Swedish
Leikkaavuudet:
ay901007Y Second Official Language (Swedish) (OPEN UNI) 3.0 op

Ei opintojaksokuvauksia.

350007Y: Statistical computing, 5 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Pentti Nieminen
Opintokohteen oppimateriaali:
Uhari, Matti , , 2001, pakollinen
Opintokohteen kielet: Finnish
Leikkaavuudet:
ay350007Y Applied statistics and ADP (OPEN UNI) 5.0 op

ECTS Credits:
5 ECTS
Language of instruction:
Finnish
Timing:
1st year spring term
Learning outcomes:
The student can design data collection, she/he can enter the data to computer and can use statistical software to analyze the data. The student is able to report results and can critically read research articles
Contents:
Basic concepts. Methods of basic statistical analysis and inference. Statistical software and their use.
Learning activities and teaching methods:
Lectures 12 hours, group work 21 hours.
Recommended or required reading:
Assessment methods and criteria:
Exam, written report about data analysis and participation in workgroups.
Grading:
Pass / Failed
Person responsible:
Pentti Nieminen, Ph.D., Faculty of Medicine

350005Y: Statistics, 6 op

Opiskelumuoto: General Studies
Laji: Course
Vastuuysikkö: Institute of Health Sciences
Arvostelu: 1 - 5, pass, fail
Opettajat: Maria Laukkala
Opintokohteen oppimateriaali:
Heikkilä, Tarja , , 2004, pakollinen
Helenius, Hans , , 1989, pakollinen
Opintokohteen kielet: Finnish

Leikkaavuudet:

ay350005Y  Statistics (OPEN UNI)  6.0 op

ECTS Credits:
6 ECTS

Language of instruction:
Finnish

Timing:
First year autumn term

Learning outcomes:
Upon completion student get to know quantitative research planning process to get numeric observational data. Student is able to describe things which are examined by tables, figures and parameters. Student knows the principles of distribution and test theory and knows how to use statistic reasoning methods and models in quantitative data.

Contents:

Learning activities and teaching methods:
Lectures 40 hours. Individual and group work 50 hours.

Recommended or required reading:

You can check the literature availability at this link

Grading:
Pass / Fail

350001Y: Study planning and tutorial, 1 - 3 op

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

ECTS Credits:
2 ECTS

Language of instruction:
Finnish

Timing:
1st year autumn term - 2nd year autumn term

Learning outcomes:
The student knows the structure and aims of health science education. The student will be able to plan his/her own studies.

Contents:
Introduction to university studies: the structure of the education, its aims and contents. Study methods, individual study plan and learning assessment.

Learning activities and teaching methods:
Information sessions, student tutoring, teacher tutoring, independent studying, and workshops.

Recommended or required reading:
Curriculum

Assessment methods and criteria:
Individual study plan and its continuous self assessment, participation in student tutoring, teacher tutoring and workshops. Indivial study plan will be turned in to teacher tutor by the end of autumn term.

Grading:
Pass / fail

**Person responsible:**
Assistant and teacher tutors