

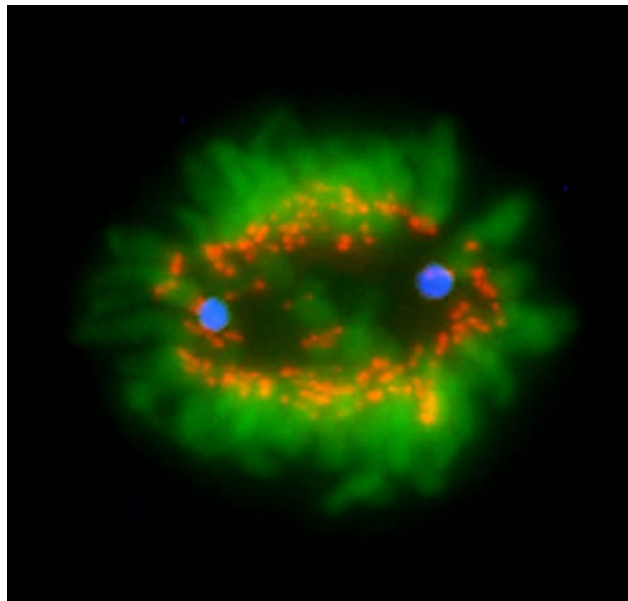


Turun yliopisto  
University of Turku

# **STUDY GUIDE**

## **MASTER'S DEGREE PROGRAMME IN BIOMEDICAL IMAGING**

**2011-2012**



Updated 19.01.2012

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This guidebook has been compiled for students that study at the University of Turku in the Master's Degree Programme in Biomedical Imaging. Its purpose is to give information about the University of Turku, the Faculty of Medicine and certain procedures, the study programme and the structure of the studies.

# 1 Faculty of Medicine

## 1.1 The Faculty of Medicine and decision making

The Faculty of Medicine at the University of Turku has five separate departments and institutes: the Department of Nursing Science, the Institutes of Biomedicine, Clinical Medicine, Dentistry, and Microbiology and Pathology.

The faculty is led by a dean, *professor Tapani Rönnemaa*. The decisions at the Faculty are made by the dean and the Faculty Council. The members of the Council, consisting of professors, teachers, researchers, other personnel and students, are elected for a period of three years. The Dean acts as the chairman of the Faculty Council.

Vice deans are *professors Sirpa Jalkanen, Risto Huupponen and Pekka Hänninen*, who is the responsible professor of the Master's Degree Programme in Biomedical imaging.

The decision body for the Master's Degree Programme in Biomedical Imaging is the steering committee of the programme. The committee consists of professors, teachers, administrative personnel and student members. Student members are elected annually among the first year students of the programme.

[http://www.med.utu.fi/sivustot/bioimaging/introduction/Programme\\_Administration/](http://www.med.utu.fi/sivustot/bioimaging/introduction/Programme_Administration/)

Faculty of Medicine offers five degrees: Licentiate in Medicine, Licentiate in Dentistry, Bachelor/Master of Health Sciences (Nursing Sciences) and Master Programmes in Health Biosciences and in Biomedical Imaging. The language of education is Finnish in all other degrees except in Biomedical Imaging in which teaching is organised in English.

## 1.2 The Faculty office

The office of the Faculty of Medicine is located in Varia building, visiting address is Itäinen Pitkätie 1. Mailing address is Kiinamylynkatu 13, 20520 Turku. The office is open Monday-Friday at 8-11 and 12-15.15.

Location on the campus map: T35, <http://www.utu.fi/kartta/indexen.html>

The person responsible for student affairs related to the Master's Programme of Biomedical Imaging is the *head of administration Heli Törmänen*.

Telephone (02) 333 8526, e-mail: [heltor@utu.fi](mailto:heltor@utu.fi)

The *international officer* in the Faculty of Medicine is *Kaija Kangasjärvi*.

Telephone (02) 333 8405, e-mail: [kaija.kangasjarvi@utu.fi](mailto:kaija.kangasjarvi@utu.fi)

Her office is located in Turku School of Economics (T57), Rehtorinpellonkatu 3.

Some of the office personnel can be found in Villa Joukahainen, next to Medisiina (T30) building. Mailing address is Joukahaisenkatu 2, 20520 Turku. The office is open Monday-Friday 12-15. Study transcripts (see also 1.8.) can be obtained there from the *study secretaries*:

*Raija Ahokas*, (02) 333 8484, e-mail: [raija.ahokas@utu.fi](mailto:raija.ahokas@utu.fi)

or

*Katja Kirstilä*, (02) 333 8445, e-mail: [katja.kirstila@utu.fi](mailto:katja.kirstila@utu.fi).

The coordinators of the Master's programme of Biomedical Imaging are

*Maritta Löytömäki*, e-mail [makrpy@utu.fi](mailto:makrpy@utu.fi)

and

*Eeva Rainio*, e-mail [eerainio@utu.fi](mailto:eerainio@utu.fi)

Their office is located in the BioCity building (T38), 6<sup>th</sup> floor, at Turku Centre for Biotechnology. Telephone (02) 333 8046, mobile 050 409 6642.

### **The study office of the Institute of Biomedicine**

The study office of the *Institute of Biomedicine* is located in Medisiina building, second floor. Mailing address is Kiinamylynkatu 10, 20520 Turku. It is open Monday-Friday at 11-13. Medisiina on the campus map: T30

Persons working there are:

Secretary Marjatta Keistinen (02) 333 7575, [marjatta.keistinen@utu.fi](mailto:marjatta.keistinen@utu.fi)

Lecturer Jorma Paranko (02) 333 7228, [jorma.paranko@utu.fi](mailto:jorma.paranko@utu.fi)

Information about the administration (both in English and Finnish) can also be found on:

<http://www.med.utu.fi/hallinto/yhteystiedot/index.html>

and

<http://www.med.utu.fi/en/administration/>

## 1.3 The academic neighbourhood

University of Turku is located in the oldest city in Finland, close to the medieval Cathedral and the old buildings where the first university in Finland was operating. The institutes of the Faculty of Medicine are found in buildings near to the University Hospital (TYKS) and in the specialised research centers, BioCity and PharmaCity.

The teaching for the Master's Degree Programme in Biomedical Imaging Programme takes place mainly in the BioCity-building (T38 on the map), where the laboratory of Medical Physics and Engineering is located. Medical Physics and Engineering laboratory is part of the division of Cell biology and Anatomy in the Institute of Biomedicine, and the head of the laboratory is *professor Pekka Hänninen*.

The teaching provided by the Åbo Akademi University Department of Biosciences is also mostly offered in BioCity.

You can find a map over the campus at the following address:

<http://www.utu.fi/kartta/kampuskartta.htm>

## 1.4 Registration for the academic year

In order to be officially recorded as a student, all students must register at the university. Registration takes place at Student and Admission Services. All students who have been accepted to study at the university will receive information on registration by post. Only students who are currently registered as attending have the right to take part in examinations and have their credits entered into the study register.

A new student who has been admitted to the university is registered as a student of the university only after he or she has accepted the study place from the faculty and notified the university.

## Period of Registration for 2011-2012

The registration period for the academic year 2011-2012 starts May 23rd 2011 and ends September 2nd 2011. The registration will be entered in the university study register within one week after the membership fee has been paid.

### Registration procedure for new students

- A new undergraduate student registers **as attending** by paying the [Student Union Membership fee](#) using the personal reference number. The reference number is noted on the payment form, which is given to the applicant after she/he has shown the original degree certificate to the coordinator of the Master's programme. Remember also to confirm the admission to the university by sending in the signed confirmation form.
- A new undergraduate student registers as **a non-attending** by sending the confirmation form to the Faculty Office or by e-mail to the Student and Admission Services (ilmoittautuminen [at] utu.fi) by Tuesday, August 2nd 2011.

If a student who has registered for non-attendance wants to continue his/her studies in the same academic year, he or she can change the status at any time during the academic year.

After the registration the student will be sent a print-out of the study register, a so-called transcript of basic information recorded in the system. The transcript should be checked carefully. It includes the student number of the University of Turku.

### ***A registration fee of 35 euros will be charged for the late registration!***

This registration fee must be paid to a different account than the Student Union membership fee. This bank account number is available at Student and Admission Services. The fee will not be charged, if you have been granted the study right for a new degree from your faculty.

## 1.5 Course registration

### **Course registration at the University of Turku**

Registration to courses might be required. In these cases registration is done in a Virtual Study Register called Nettiopsu: <http://nettiopsu.utu.fi>.

More information about Nettiopsu can be found:

<http://www.utu.fi/en/studying/studies/studyregister/nettiopsu.html>

Accessing these pages requires that the student has a valid user ID issued by the University of Turku Computing Centre.

Sometimes registration is done on registration list found on a notice board.

Always check with the teacher/coordinator well in advance if registration is required and how it is done.

### **Course registration at Åbo Akademi University**

In Åbo Akademi University the course registration can be done in Minplan: <http://www.abo.fi/minplan>. Instructions for course registration are found at the following address: <https://www.abo.fi/student/minplanmanualer> (scroll down to "For students: Information about MinPlan in English").

### **Important:**

Students at the Master's degree programme of Biomedical imaging whose home university is the University of Turku require study rights to take the programme courses at Åbo Akademi University.

Application of study rights is done through the electronic JOO application system. For more information see 1.13 on page 6.

## 1.6 Examinations

### **Examinations at the University of Turku**

The first course exam is arranged at the end of the course. The course exams do not necessarily require registration.

In addition to the course exams there should be 3 general exams arranged for each course every academic year. For general exams, the student should register for the exam.

Registration to exams held on general examination days of the Faculty of Medicine should be done through NettiOpsu: <https://nettiopsu.utu.fi/>.

Manuals on exam registration can be found at:

<http://www.utu.fi/en/studying/studies/studyregister/nettiopsu.html>.

The general examination days in the Institute of Biomedicine are:

### **Summer examination 2011**

Mon 8.8.2011 at 8:00, registration ends 30.6.2011.

This exam will be held either in Osmo Järvi, Externum tai Mikro auditorium.

### **General examination days for 2011-2012**

Tue 20.9.2011 at 16:00, Osmo Järvi Auditorium

Tue 22.11.2011 at 16:00, Osmo Järvi Auditorium

Tue 21.2.2012 at 16:00, Osmo Järvi Auditorium

Tue 17.4.2012 at 16:00, Osmo Järvi Auditorium

Note! All the departments are not yet using the NettiOpsu system. There might also be other electronic services given by the departments - you can always check with the teacher, coordinator or the department secretary.

There are only three opportunities to take an exam in the same course, after that the course lecturer should be contacted and the matter discussed. Registering for an exam counts as one of these three times even if the student does not show up at the actual exam occasion.

Students are usually not allowed to bring the course material with them to the exams, so always check with the course lecturer what material is allowed in each exam. Coats, bags, mobile phones etc. should be left outside the exam room or at the back of the room. If requested by the exam supervisor, students should be prepared to show proof of identification, e.g. a student card.

Exam results are published on the notice boards and on the internal intranet network. The virtual exam result service, Wentti, can be found on the Student Services webpages [www.utu.fi/opiskelu/wentti/en.html](http://www.utu.fi/opiskelu/wentti/en.html). Accessing these pages requires that the student has a valid user ID issued by the University of Turku Computing Centre.

The results of the courses are registered in University's study register (OPSU).

[http://www.utu.fi/en/studying/studies/information\\_guide/register.html](http://www.utu.fi/en/studying/studies/information_guide/register.html)

## Examinations at Åbo Akademi University

Most exams are on Fridays (in Biology) but the students should register for exams at least a week before the day of the exam. The registration is done in MinPlan: <http://www.abo.fi/minplan>. Instructions for registration for examinations are found at the following address: <https://www.abo.fi/student/minplanmanualer> (scroll down to “For students: Information about MinPlan in English”).

### 1.7 Credit and grading system

At Finnish universities, 1 credit, *cr* (*opintopiste*, abbreviated *op*) equals 1 ECTS credit.

**ECTS**, the European Credit Transfer System, was developed by the European Commission to provide common procedures that guarantee full transfer of credits for studies abroad toward the final qualification in the home country. ECTS credits are a value allocated to course units and they describe the workload required to complete a course/module.

1 credit is equal to 27 hours worth of work for a course, seminar or book exam or other methods of teaching. This amount of work includes contact hours and/or outside independent study. 60 credits represent the workload of one year of full-time studies.

#### Grading

The grading or assessment of courses usually includes lectures, course participation, essay writing and/or a written examination. An exam may not only be based on lecture notes but may include independent outside study as well. Some courses are graded on a pass/fail basis only. **Important:** Incomplete or failed courses will not be registered or shown in the study transcript!

Courses are assessed according to the following scale, which can be compared with ECTS and USA grades:

#### Finnish grading scale qualitative definition ECTS grades US grades

5	excellent	A	A+
4	very good	B	A
3	good	C	B
2	satisfactory	D	C
1	sufficient	E	D
0	fail	F/FX	F

A completed study module will be assessed with a final grade. The calculated average between the grade and the amount of credits will result in the final grade of a study module:

#### Correlative quantitative value Final grade of the study module

4.50–5	5 Excellent (ET)
3.50–4.49	4 Very good (KT)
2.50–3.49	3 Good (HT)
1.50–2.49	2 Satisfactory (TT)
1–1.49	1 Sufficient (VT)

## Publishing grades

When a course or unit of study has been given a final grade, it will be posted on the notice boards of the department or faculty in question (Biomedicine in Medisiina 2nd) and also on [Wentti](#). According to Finnish regulation, since examinations with their grades are included in a degree, which is considered public information, examination results may be openly published. However due to the regulations on the protection of personal information, both the name and number of the student may not be publicly published simultaneously.

### 1.8 Certificates and study transcripts

All of the completed studies in the study register are shown in a transcript which can be printed out and used for, e.g. when applying for grants or a job. An e-mail transcript is the most convenient way to check your own studies in the study register.

The transcript in English can be requested through [transcript@utu.fi](mailto:transcript@utu.fi). The transcript can be requested in Finnish through [ote@utu.fi](mailto:ote@utu.fi). The transcript will automatically be sent to the university e-mail address the request was sent from.

The transcript is also available as a hard copy printout. A signed and stamped transcript is available at department and faculty offices. A transcript can also be obtained at Student Services while you wait. The transcript will be given to the student in question with proof of identification.

If you want a transcript by post, you must send a stamped, self-addressed envelope (first class postage stamp) to: Student Services, University of Turku, FI-20014 TURUN YLIOPISTO. The envelope should be accompanied by a cover letter with your student number and date of birth.

**Important!** According to the JOO agreement, information on studies completed at Åbo Akademi University or Turku School of Economics are transferred automatically to the University of Turku student register.

If the student must get the studies transferred from the other university without any delay, he/she should ask for a transcript from that university and bring it to the Student services who will see that the study achievements are transferred into the study record.

### 1.9 Computers, printers and copying machines

#### Computing Centre services

The Computing Centre is a data administration unit of the University of Turku. It takes care of computer services such as local network management (maintenance, development, security and network services), the maintenance and development of support for selected systems and software, the help desk (user guidance, hardware and software retrieval, maintenance) and the development and coordination of administrative applications.

The server system managed by the Computing Centre is available to all members of the university. The Computing Centre help desk is located at Educarium, 4th floor, Assistentinkatu 5 (T47 on the map) and is open weekdays from 8.00 to 16.00. At the help desk, you can purchase a magnetic key for accessing the computer labs of the Computing Centre, submit an application for a user account as well as ask for advice about problem situations.

Many departments have their own computer labs for students to use. The students of Master's Degree Programme in Biomedical imaging can use the computer lab in Verstaas <http://www.utu.fi/kartta/indexen.html> (T34) and in Medisiina first floor (T30). The keys for these labs are available in the Study office of Biomedicine with 10 euro deposit fee.

The Åbo Akademi University Department of Biosciences in Biocity also has well-equipped computer labs for student use. Those can be only logged in with Åbo Akademi University user names. There are also computers available in the ICT building and these can be logged in with user names of both universities.

In addition to these, the Computing Centre also maintains computer facilities for public use. Detailed information on computer labs and other services provided by the Computing Centre are available on the Computing Centre web pages at [www.cc.utu.fi/en](http://www.cc.utu.fi/en) and in the guide *Computer services for students* available at [www.cc.utu.fi/tiedostot/student2006-en-www.pdf](http://www.cc.utu.fi/tiedostot/student2006-en-www.pdf).

**Important!** Remember always to log off after use, so that no one else can use your computer domain.

### **User account**

New students receive their user account automatically and they are individually notified about activating it. All students will need a user account at some point in their studies. The terms of use must be explicitly followed. The user account is valid only for students registered as attending. If a student withdraws his/her registration or registers as non-attending, the account will immediately be closed.

More information on user accounts and passwords is available on the Computing Centre webpages at [www.cc.utu.fi/en/services/useraccount](http://www.cc.utu.fi/en/services/useraccount).

### **Copying service**

The university has copying machines that work with a specific copy card. There are cards for 10, 50, 100, 215 or 400 copies and they are sold at the University Copy Centre (Natural Science Building I), the café in Calonia, ground floor lobby at Educarium, Juslenia, and Fennicum, the Medical Library, the Main library, the Course Book Library, the Law Library in Calonia, the Bio-geosciences Library, the office of the Faculty of Social Sciences (Publicum, 1st floor), the Library of Educational and Social Sciences at Educarium and at Digipaino (Lemminkäisenkatu 1). When making copies, the number of copies made will be subtracted from the balance of the card. The card does not need to be used all at once.

Photocopiers that work with a card can be found e.g. at the following locations:

- Main Building, ground floor
- Natural Science Building I, copy centre
- Natural Science Building II, 1st floor, Bio-geosciences library
- Main Library, 2nd floor
- Educarium, ground floor lobby
- Calonia, lobby
- Calonia, Law library
- Juslenia, ground floor lobby
- Quantum Library, ground floor
- Medical Library, Medisiina 2nd floor
- Arcanum library 3rd floor
- Publicum, 4th floor

## 1.10 Libraries

For students of the University of Turku, the student card is also a library card. The number below the bar code on the back of the student card serves as a personal patron number in the University of Turku library.

You can use the same library card, i.e. your University of Turku student card at any of the four university libraries: University of Turku, Åbo Akademi University, Turku School of Economics and Turku Polytechnic. However, the student card needs to be activated in the above mentioned libraries, which means that the first time you borrow from the library, you will be asked to show your ID, state your address and show the student card given to you, so that its number and other information can be entered into the database of the library in question.

Turku City Library is the only large library in Turku using a different kind of library system requiring a library card of its own.

<b>Library</b>	<b>Internet address</b>	<b>Name of the database</b>
University of Turku Library	<a href="http://kirjasto.utu.fi">kirjasto.utu.fi</a>	Volter
Åbo Akademi University Library	<a href="http://www.abo.fi/public/en/bibliotek">/www.abo.fi/public/en/bibliotek</a>	Alma
Turku City Library	<a href="http://www.turku.fi/kirja">www.turku.fi/kirja</a>	Aino
Turku School of Economics Library	<a href="http://www.tse.fi/EN/units/specialunits/library">www.tse.fi/EN/units/specialunits/library</a>	Valpuri
Turku Polytechnic Library	<a href="http://www.turkuamk.fi/kirjasto">www.turkuamk.fi/kirjasto</a>	Aura

University of Turku Library has several branches including own libraries for departments and the course book library.

In addition to these there is The Student Union of the University of Turku Library which can be a useful source in hunting the course books.

More information about libraries, their locations and contact informations can be found at:  
[http://www.utu.fi/en/studying/studies/information\\_guide/libraries.html](http://www.utu.fi/en/studying/studies/information_guide/libraries.html)

## 1.11 Career Services

### **Turku Academic Career Services**

The Career Services at the University of Turku are located in the Agricola-building, Henrikinkatu 1b. They provide information for both graduates and students. Their main task is to help students enter the labour market and to advice them on issues dealing with job-hunting. The Career Services offer employers direct access to highly skilled students and graduates. In addition, Career Services arrange information sessions and group training in job seeking and one-day seminars on the employment opportunities in various fields.

Turku Academic Career Services can assist and give advice about applying for domestic and international internships. Current information about the activities of Career Services is available by joining the mailing list on the website. The service also provides information about entrepreneurship.

University of Turku career services work in close co-operation with the Career Services at the Åbo Akademi University and the Turku Employment Office. More information can be found at <http://rekrytointi.utu.fi/en/>.

## 1.12 Student tutor and teacher tutor

All first-year students are assigned a student tutor and a teacher tutor. The student tutor is an older student who helps the new students adapt to student life in Turku whereas the teacher tutor gives advice in study-related matters.

Student tutors (academic year 2010-11) for students admitted to the programme at the University of Turku are Ahmed Musrati, [ahsamu@utu.fi](mailto:ahsamu@utu.fi), and Thi Tam Pham, [tam.pham@utu.fi](mailto:tam.pham@utu.fi).

Teacher tutor for students admitted to the programme is MSc Sami Koho ([sakoho@utu.fi](mailto:sakoho@utu.fi)). He is a graduate student in the laboratory of Medical Physics and Engineering, Biocity 5<sup>th</sup> floor.

## 1.13 Student activities

The Student Union of the University of Turku (*Turun yliopiston ylioppilaskunta*, TYY, <http://www.tyy.fi/in-english>) is an organisation within the university which serves the interests of the students and takes a stand on issues important to them. All Master's degree students of the University of Turku are automatically members of the Student Union.

The annual membership fee of the Student Union is around 100 €. By being a member you receive a student card. The Lyyra student card works as a payment as well as discount card. There is no charge for using the Lyyra card nor are there any yearly or monthly fees. There is an ordering fee of €15.00 which is payable through the Lyyra website at [www.lyyra.fi](http://www.lyyra.fi).

You get the most concrete benefit of being a member of the Student Union with the student card. You need the card for proof of identity when, e.g. visiting FSHS (Finnish Student Health Service) or when borrowing books from the university libraries. Master's and Bachelor's degree students with the student card are entitled to e.g. discounts on long distance trains and buses and government subsidised student lunches. There are also several businesses and shops in Turku that give student discounts.

## 1.14 Flexible study right: studies at the University of Turku

University of Turku has an agreement of flexible study rights with the Åbo Akademi University. According to this agreement students from University of Turku can freely take courses that are offered by the Åbo Akademi University.

The student sends in an electronic application for flexible study right which has to be approved by University of Turku as well as by the Åbo Akademi University. The application is found at <http://www.joopas.fi> (→ Joopas Application System). When the application is accepted, the student will get ÅAU student number and computing user account. Without this application the student does not have the right to study at the Åbo Akademi and will not get the credits registered.

## 2 Study programme

### 2.1 Academic year

The academic year starts 1 August and ends 31 July. The year is divided into two semesters:

Autumn: 1 September – 31 December and Spring: 1 January – 31 May

Holidays mainly follow the public holidays in Finland.

Winter holidays: 20.12.2011-7.1.2012

Easter holidays: 5.-21.4.2012

Summer holidays: 1.6.2012-31.8.2012

More information can be found on: [http://www.utu.fi/en/studying/studies/academic\\_year.html](http://www.utu.fi/en/studying/studies/academic_year.html)

In Åbo Akademi University the study year is divided into four periods; two during the autumn and two during the spring. The dates for the periods for the academic year 2011-2012:

Period I: w. 36-43	5 September-28 October 2011 (8 weeks)
Period II: w. 44-51	31 October-21 December 2011 (7,5 weeks)
Period III: w. 2-10	9 January-9 March 2012 (9 weeks)
Period IV: w. 11-21	12 March-25 May 2012 (11 weeks)

In this study guide the courses are divided into ÅAU periods, but ***these periods are not used in the Faculty of Medicine.***

### 2.2 Structure of the studies

The Master's Degree Programme in Biomedical Imaging has a duration of two academic years and accounts for 120 cr. This means that the student should complete 60 cr each academic year. In addition, students accepted to the programme may be required to compensate courses depending on their background with complementary studies (max. 60 ECTS). These additional studies are not included in the Master's degree. The aim of these studies is to bring everyone to approximately compatible skills in terms of their background in biosciences and other topics that are relevant for the area.

According to the new University Law, each student will formulate a personal study plan (PSP) (*henkilökohtainen opintosuunnitelma*, HOPS, in Finnish) in the beginning of the programme. This will be done with the help of an advisor in order to determine the content of the studies, depending on previous education, and to schedule the studies in order to graduate in two years.

The structure of the programme as well as all the courses are available in NettiOpsu in eHOPS, i.e. electronic Personal Study Plan. eHOPS is designed to help students to administer their own study plans. It can be found at: <https://nettiopsu.utu.fi/hops/etusivu.html>.

The Master of Science degree in the Master's Degree Programme in Biomedical Imaging has the following structure:

<b>Major subject studies in Biomedical imaging, mandatory courses</b> 45 ECTS
<b>Master's thesis in Biomedical imaging</b> 45 ECTS thesis plan, seminar and practical laboratory part (25 ECTS) written thesis (20 ECTS)

<b>Selectable/elective studies on different thematic areas and special themes</b> 25 ECTS	<b>Finnish language studies</b> 5 ECTS
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## Curriculum

### Course structure for studies of Biomedical imaging

Colour codes for thematic areas:

Advanced cell biology ■

Biophysics ■

Information technology and image processing ■

Advanced microscopy and imaging techniques ■

Nanotechnology ■

Laboratory animal models and in vivo imaging techniques ■

Pathology ■

Mathematics ■

Other ■

#### MANDATORY COURSES

##### Course code and Title

##### Credits

##### Complementary courses depending on the previous studies

ÅA_1901	Introduction to Cell Biology ÅAU	3 ECTS
ÅA_1902	Laboratory Basics ÅAU	2 ECTS

##### OR

ÅA_1903	Introduction to Biophysics ÅAU	5 ECTS
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**NOTE:** If the student has studied both physics and biology before, he/she can select 5 ECTS of other studies.

##### Major subject studies

ANAT5101	Physical Basis of Medical Imaging UTU	4 ECTS
ANAT5103	Biomedical Instrumentation UTU	5 ECTS
ANAT5104	Biomedical Instrumentation Laboratory Course UTU	4 ECTS
ANAT5105	Fluorescence in Bioanalytical Research UTU	4 ECTS
BIMA2101	Digital Image Processing I BTK	5 ECTS
BIMA2106	Making Presentations and Art from Bioimages UTU FinalCutPro basics	2 ECTS
ÅA_2902	Microscopy and Microtechniques ÅAU	3 ECTS
BIMA2104	Nanosopic Imaging in Biomedical Research - basics UTU	2 ECTS
BKEM1012	Bionano Lecture Course UTU	4 ECTS
BIMA2103	Mandatory participation in seminar series (20h) - BioCity Turku seminars (FoS seminars) - Seminar series of Turku Biolmaging - PET Monday Seminars and PET Basics I and II seminars - TCDM Seminar program - CoE seminar program - Other seminar series	1 ECTS
BIMA2105	Biomedical Ethics UTU	1 ECTS
ÅA_2901	Image Perception and Cognition ÅAU	5 ECTS

#### MASTER'S THESIS

BIMA 2202	Thesis plan, seminar and practical laboratory work	25 ECTS
BIMA2203	Writing the Master's thesis	20 ECTS

Also a possibility to international internships as a part of the Master's thesis.

##### Specialization at Thesis Level in one of four topics major themes

- Light Microscopy Imaging
- In vivo & Clinical Imaging
- Imaging in Nanotechnology and Material Sciences
- Microscopy Techniques and Instrument Design

**SELECTABLE STUDIES ON DIFFERENT THEMATIC AREAS**

<b>Course code and Title</b>	<b>Credits</b>
<b>Advanced cell biology</b>	
283007.0 Cell signaling ÅAU	8 ECTS
223068.0 Structure and function of the cytoskeleton ÅAU	6 ECTS
<b>Biophysics</b>	
233004.0 Electronic properties of organic materials ÅAU	10 ECTS
233035.0 Biophysics ÅAU	10 ECTS
ANAT5102 Medical Imaging Project Work UTU	5 ECTS
<b>Information technology and image processing</b>	
BIMA2107 Making Presentations and Art from Bioimages -Video project UTU	3 ECTS
BIOI2250 Introduction to programming UTU	6 ECTS
BIOI2290 Math and CS for bioinformatics UTU	3 ECTS
TKO_2082 Introduction to Information Technology I UTU	2 ECTS
TKO_2083 Introduction to Information technology II UTU	3 ECTS
TKO_5094 Basics of Digital Image Processing UTU	5 ECTS
TKO_5109 Basics of Digital Video Processing UTU	5 ECTS
TKO_2011 Data Structure and Algorithms UTU	5 ECTS
TKO_5436 Multimedia databases UTU	5 ECTS
TKO_5110 Web programming UTU	5 ECTS
BIOI4290 Tools for intelligent Data Analysis UTU	4 ECTS
TKO_5437 Data mining UTU	5 ECTS
<b>Advanced microscopy and imaging techniques</b>	
223038.0 Advanced Microscopy I ÅAU	5 ECTS
BIMA210X Nanoscopic Imaging in Biomedical Research - advanced UTU	2 ECTS
<b>Laboratory animal models and in vivo imaging techniques</b>	
PGS1024 Laboratory Animal Course UTU	6 ECTS
TCDM3101 Hands-on course including different techniques UTU <i>Optical imaging (TCDM)</i> <i>MicroPET/CT (TCDM)</i> <i>MicroCT - pQCT (TCDM)</i> <i>Radiography (TCDM)</i> <i>Ultrasound (TCDM)</i>	3 ECTS
<b>Pathology</b>	
PATOLXX Immunohistochemistry – methods and applications UTU	3 ECTS
PATOLXX In situ hybridization – methods and applications UTU	3 ECTS
PATOLXX Principles of microscopic diagnostic pathology – basic methods and morphologic alterations in disease (includes www-based virtual microscopy) UTU	5 ECTS
<b>Mathematics</b>	
MATE5258 Image and Video Compression UTU	10 ECTS
SMAT5216 Modelling Project UTU	10 ECTS
MATE5275 Scientific Computing UTU	4 ECTS
MATE5276 Scientific Computing 2 UTU	4 ECTS

## **SPECIAL THEMES**

**Courses given upon interest/by visiting lecturers/by graduate schools.**

**Not available every year.**

**Course code and Title**

**Credits**

XXXX

Protein structure and function

XXXX

Courses on animal physiology, anatomy, immunology, microbiology etc.

BIMA3111

Imaging as a tool to analyse protein dynamics

BIMA3112

Interactions and localisation (FRAP, FRET, FLIM...)

BIMA3113

Ultra-high resolution microscopy STED

BIMA3114

Fluorescent speckle microscopy

BIMA3115

Fluorescence correlation spectroscopy

BIMA3110

International courses on live cell imaging

BTKXXX

MS imaging course

BIMA3101

International lecture course on flow cytometry

BIMA3103

Flow-cytometry basics

2 ECTS

BIMA3104

Laboratory course on flow-cytometry

2 ECTS

PETC3101

International PET symposium

PETC3102

International courses on advanced PET imaging

ÅA\_\_3908

Computational modeling in biology I

5 ECTS

ÅA\_\_3909

Computational modeling in biology II

5 ECTS

ÅA\_\_3910

Molecular computing (synthetic biology) (planned)

5 ECTS

BTK/CIC

Digital Image processing II

2 ECTS

BKEMXXX

A laboratory course on nano-related applications of AFM

ÅA\_\_3903

Nanoparticulate dyes (short course/integrated)

ÅA\_\_3904

International course on nanotechnology

BIMAXXXX

International laboratory courses and visits

## **LANGUAGE STUDIES**

**Course code and Title**

**Credits**

### **Mandatory Language Studies (5 ECTS)**

*The studies include a mandatory course in Finnish (5 ECTS) for the students of the University of Turku.*

**NOTE:** If the student already meets these language requirements he/she is exempted and can select 5 ECTS other studies (language or subject related).

KIFF0003

Finnish for Foreigners, Intensive Beginners Course

5 ECTS

### **Optional Language studies**

KIEN2022

Basic Academic Writing Skills in English

3 ECTS

KIEN3321

Advanced Academic Writing Skills in English

3 ECTS

SUKI1258

Knowledge about Finland

3 ECTS

## MSc Degree Programme in Biomedical Imaging – recommended schedule for studies, academic years 2011-2013

1. study year	Autumn 2011	<p><b>Complementary studies depending on student's background</b>            ÅA_1901 Introduction to Cell Biology 3 ECTS            ÅA_1902 Laboratory Basics 2 ECTS <b>OR</b>            ÅA_1903 Introduction to Biophysics 5 ECTS</p> <p><b>Major subject studies in Biomedical Imaging, mandatory courses</b>            BIMA2101 Digital Image Processing I 5 ECTS            BIMA2102 Making Presentations and Art from Bioimages – FinalCutPro basics 2 ECTS            ÅA_2901 Image Perception and Cognition 5 ECTS            BIMA2105 Biomedical Ethics 1 ECTS            BIMA2103 Mandatory participation in seminar series (20h) 1 ECTS</p> <p><b>Mandatory Language Studies</b>            KIFF0003 Finnish for Foreigners, Intensive Beginners Course 5 ECTS</p>
	Spring 2012	<p><b>Major subject studies in Biomedical Imaging, mandatory courses(continues)</b>            ÅA_2902 Microscopy and Microtechniques 3 ECTS            ANAT5101 Physical Basis of Medical Imaging 4 ECTS            ANAT5103 Biomedical Instrumentation 5 ECTS            ANAT5104 Biomedical Instrumentation Laboratory Course 4 ECTS            ANAT5105 Fluorescence in Bioanalytical Research 4 ECTS            BIMA2104 Nanoscopic Imaging in Biomedical Research 2 ECTS            BKEM1012 Bionano Lecture Course 4 ECTS            BIMA2103 Mandatory participation in seminar series (20h) 1 ECTS (continues)</p> <p><b>Selectable/elective studies</b></p>
2. study year	Autumn 2012	<p><b>Selectable/elective studies (continues)</b>  <b>Optional Language studies</b></p> <p><b>Master's Thesis in Biomedical Imaging (thesis plan + seminar), 45 ECTS</b>            (Possibility to international internship as part of the MSc thesis)</p>
	Spring 2013	<p><b>Master's Thesis in Biomedical Imaging (continues)</b>  <b>Selectable/elective studies (continues)</b></p>

### 2.3 Course information: lecture dates and times

#### Period I (5.9.-28.10. 2011)

Code	Course name	Person in charge	ECTS	Period	Time	Place
ÅA_1901	Introduction to Cell Biology (complementary studies)	John Eriksson	3	I	Fridays at 14.00-16.00 (first lecture 14.10)	ÅAU Biochemistry lecture room, Biocity 3 <sup>rd</sup> floor
ÅA_1902	Laboratory Basics (complementary studies, NOTE: 1 <sup>st</sup> lecture is mandatory for all students)	Annika Meinander, Diana Toivola	2	I	Weeks 36-39 Wed 7.9 at 8-10 (Lecture I) Fri 9.9 at 13-16 (Lecture II) Quizzes and calculation on week 38 Lab exercise on week 39	Aud. Wikgren (Biocity 1 <sup>st</sup> floor)
ÅA_1903	Introduction to Biophysics (complementary studies)	Tom Lönnroth	5	I	Weeks 36-43 Mon 10-12 Wed 13-15 Fri 8-10 (exercises)	Aud. Ekwall (Gadolinia)
BIMA2101	<a href="#">Digital Image Processing I</a>	Rolf Sara & Perttu Terho	5	I	Weeks 36-42 (6.9→) Tue 6.9 at 13-15 (Wikgren) Wed 7.9 at 10-12 (Wikgren) Thu 8.9 at 9-11 (computer room) Fri 9.9 at 10-12 (computer room) Mon 12.9 at 12-14 (computer room) Tue 13.9 at 10-12 (Wikgren) Wed 14.9 at 10-12 (computer room) Thu 15.9 at 10-12 (computer room) Fri 16.9 at 10-12 (computer room) Mon 19.9 at 13-15 (computer room)	Aud. Wikgren, (Biocity 1 <sup>st</sup> floor) & ÅA Biochemistry Computer room (Biocity 3rd floor)
KIFF0003	<a href="#">Finnish for Foreigners: Intensive Beginners' Course</a>	Pirkko Hölttä	5	I-II	Weeks 37-47 (12.9 ->) Mon, Wed, Thu at 14.15-15.45 (afternoon group)	Mon, Studio 4, Juslenia Wed, Studio 3, Juslenia Thu, Room 271, Juslenia

ÅA_2901	<a href="#">Image Perception and Cognition</a>	Matti Laine, Lars Berggren, Fred Andersson	5	I	Week 36 Thu 14-15; Weeks 37,39 Thu 14-17 Week 41 Thu 14-16 (Exam)	Week 36 Armfelt (A102) Weeks 37& 39 Heikon(A202)
BIMA2103	Mandatory participation in seminar series		1	I-IV	BioCity Turku seminars, Turku Bioluminescence seminars, PET seminars, TCDM seminars	Follow the information via e-mail and notice boards

## Period II (31.10-21.12. 2011)

Code	Course name	Person in charge	ECTS	Period	Time	Place
BIMA2105	Biomedical Ethics	Veikko Launis	2	II	Weeks 42-49 Mon 17.10 at 10-12 Mon 24.10 at 10-12 Mon 31.10 at 10-12 Mon 7.11 at 10-12	Aud. Wikgren (Biocity 1 <sup>st</sup> floor)
BIMA2106	Making Presentations and Art from Bioimages- FinalCutPro basics	Turku AMK/Jussi Arvio	2	II-III	Weeks 49-50 Fri 9.12 at 10.15-13 Mon 12.12 at 10.15-12 Mon 12.12 at 13-16 Mon 19.12 at 12.15-15 Weeks 3-5 16.1. at 12.15-15 (group1) 17.1. at 12.15-15 (group2) 18.1. at 12.15-15 (group3) 19.1. at 12.15-15 (group4) 31.1. at 12.15-15 (group1) 1.2. at 12.15-15 (group2) 2.2. at 12.15-15 (group3) 3.2. at 12.15-15 (group4)	9.12./ Turku Centre for Biotechnology 5 <sup>th</sup> floor seminar room 12.12 and 19.12/ Wikgren Weeks 3-5/MacLab (ÅA Biology 2 <sup>nd</sup> floor)
KIFF0003	<a href="#">Finnish for Foreigners: Intensive Beginners' Course</a>	Pirkko Hölttä	5	I-II	Weeks 37-47 (12.9 ->) Mon, Wed, Thu at 14.15-15.45	Mon, Studio 4, Juslenia Wed, Studio 3, Juslenia Thu, Room 271, Juslenia
BIMA2103	Mandatory participation in seminar series (cont. from Period I)		1	I-IV	BioCity Turku seminars, Turku Bioluminescence seminars, PET seminars, TCDM seminars	Follow the information via e-mail and notice boards

## Period III (9.1.2012 – 9.3. 2012)

Code	Course name	Person in charge	ECTS	Year	Period	Time	Place
BKEM1012	Bionano lecture course	Jyrki Heino	4	1.	III	Weeks 3-5 (17.1. – 3.2.2012) Tue 17.1. at 10-12 (Arc3) Wed 18.1. at 8-10 (Arc2) Thu 19.1. at 10-12 (Arc 3) Fri 20.1. at 10-12 (Arc2) Tue 24.1. at 10-12 (Arc3) Wed 25.1. at 10-12 (Arc3) Thu 26.1. at 10-12 (Arc 3) Fri 27.1. at 10-12 (Arc2) Tue 31.1. at 10-12 (Arc 3) Wed 1.2. at 10-12 (Arc3) Thu 2.2. at 10-12 (Arc3) Fri 3.2. at 10-12 (Arc2)	Arc3 and Arc 2 (Arcanum, Dept of Biochemistry and Chemistry)
BIMA2106	Making Presentations and Art from Bioimages- FinalCutPro basics	Turku AMK/Jussi Arvio	2	1.	II-III	Weeks 3-5 16.1. at 12.15-15 (group1) 17.1. at 12.15-15 (group2) 18.1. at 12.15-15 (group3) 19.1. at 12.15-15 (group4) 31.1. at 12.15-15 (group1) 1.2. at 12.15-15 (group2) 2.2. at 12.15-15 (group3) 3.2. at 12.15-15 (group4)	MacLab, Biocity, ÅA Biology, 2 <sup>nd</sup> floor
ANAT5101	Physical Basis of Medical Imaging	Pekka Hänninen	4	1.	II	Weeks 3-7 (20.1. ->) Fri 20.1 at 10-16 Mon 23.1 at 12-18 Mon 30.1 at 12-18 Wed 8.2 at 12-18 (Mon 13.2 at 10-16, in reserve)	Turku Centre for Biotechnology 5 <sup>th</sup> floor seminar room and PET Centre (NOTE: 20.1 at Wikgren, Biocity 1 <sup>st</sup> floor)

ANAT5103	Biomedical instrumentation	Pekka Hänninen, Juhani Soini	5	1.	III	January 2012 (will be informed during ANAT5103)	Will be informed later
ANAT5104	Biomedical instrumentation laboratory course	Juhani Soini, Pekka Hänninen	4	1.	III-IV	After ANAT5103	Will be informed during ANAT5103!
ANAT5105	Fluorescence in bioanalytical research	Pekka Hänninen, Juhani Soini	4	1.	III-IV	Weeks 10-12 (7.3. ->) Wed 7.3 at 12-16 Thu 8.3 at 12-16 Fri 9.3 at 12-16 Mon 19.3 at 8-12 Wed 21.3 at 12-16 Fri 23.3 at 8-12	7.3. at 12 - 16 Externum 8.3. at 12 - 16 Externum 9.3. at 12 - 16 Mikro 19.3 at 8 - 12 Externum 21.3 at 12 - 16 Externum 23.3 at 8 - 12 AR1 (C202)
BIMA2104	Nanoscopic imaging in biomedical research – basics  (Register by 10.1 to amjohan@utu.fi)	Lauri J. Pelliniemi	2	1.	III-IV	Weeks 4-17 (25.1-25.4.) Wednesdays 25.1 at 12.15-13.45 15.2. at 9.15-10.45 22.2. at 10.15-11.45 7.3 at 10.15-11.45 21.3 at 10.15-11.45 28.3 at 10.15-11.45 18.4 at 10.15-11.45 25.4 at 10.15-11.00	Physiology seminar room B611, Medisiina (note 21.3 at Wikgren, Biocity 1 <sup>st</sup> floor)
PETC2101 (selectable course)	PET Basics I	O. Solin	1	1.	III-IV	Part II 19-20.3 Part II 16.-17.4	PET Centre
BIMA2103	Mandatory participation in seminar series		1	1./2.	I-IV	BioCity Turku seminars, Turku Bioluminescence seminars, PET seminars, TCDM seminars	Follow the information via e-mail and notice boards

## Period IV (12.3.2012 – 25.5. 2012)

Code	Course name	Person in charge	ECTS	Year	Period	Time	Place
BIMA2104	Nanoscopic imaging in biomedical research – basics and advanced	Lauri J. Pelliniemi	2	1.	III-IV	Weeks 4-17 (25.1-25.4.) Wednesdays 25.1 at 12.15-13.45 15.2. at 9.15-10.45 22.2. at 10.15-11.45 7.3 at 10.15-11.45 21.3 at 10.15-11.45 28.3 at 10.15-11.45 18.4 at 10.15-11.45 25.4 at 10.15-11.00	Physiology seminar room B611, Medisiina (note 21.3 at Wikgren, Biocity 1 <sup>st</sup> floor)
221007.0/ÅA_2902	Microscopy and microtechniques	Annika Meinander, Diana Toivola	3	1.	IV	Lectures: 2.4. -> Week 14, Mon, Wed 10-12 Week 15, Wed, Fri 10-12  Laboratory: 16.4.-> Weeks 16-21, Mon-Fri 9-17 in groups	Lectures: ÅAU Biology Lecture room, Biocity 2 <sup>nd</sup> floor Laboratory: Course laboratory
PETC2101 (selectable course)	PET Basics I	O. Solin	1	1.	III-IV	Part II 19-20.3 Part II 16.-17.4	PET Centre  NB: the detailed programme will be informed soon
BIMA2103	Mandatory participation in seminar series		1	1./2.	I-IV	BioCity Turku seminars, Turku Bioluminescence seminars, PET seminars, TCDM seminars	Follow the information via e-mail and notice boards

## 2.4 General information about studies

General information about the studies at the University of Turku can be found in this Programme Study Guide, the Information Guide for Students, in Nettiopsu Curricula Guides and the Biomedical Imaging web pages.

## Study guide - Master's Degree Programme in Biomedical Imaging

This Study Guide gives general information about studies at the Faculty of Medicine as well as a description of certain procedures. The guide also gives information about the structure of the Master's Degree Programme, the courses that are included in the degree as well as some information about lecture times and dates. The Study Guide is handed out to all new students and can also be found at <http://www.med.utu.fi/sivustot/bioimaging/studying/> and <http://www.med.utu.fi/opiskelu/opinto-oppaat/index.html>.

## Information Guide for Students

This is handed out for all students in Orientation session but it can be printed from [http://www.utu.fi/en/studying/studies/information\\_guide/index.html](http://www.utu.fi/en/studying/studies/information_guide/index.html).

## Nettiopsu

Nettiopsu gives information about the courses offered by University of Turku, i.e. course descriptions, lecture dates, times and places as well as information about exam dates for the courses offered by the different faculties and departments.

<https://nettiopsu.utu.fi/opas/index.htm?uiLang=en&lang=en>

Faculty of Medicine, Faculty of Law and Turku School of Economics have their Curricula Guides only as printed versions (in Finnish).

<https://nettiopsu.utu.fi/opas/index.htm?uiLang=en&lang=en>

## Biomedical Imaging web pages

The Biomedical Imaging web pages give general information about the Master's Degree Programme in Biomedical Imaging and also contain study information and guides, e.g. information about the structure of the studies, course descriptions and information about lecture dates and times. Please visit the pages at <http://www.med.utu.fi/sivustot/bioimaging/>.

Updated Curriculum can be found at:

<http://www.med.utu.fi/sivustot/bioimaging/studying/curriculum/>

You can also e-mail the coordinator of the programme: [bioimaging@utu.fi](mailto:bioimaging@utu.fi)

## 2.5 Graduation and diploma

When all courses are completed and the Master's thesis is approved, the student can graduate and get his or her diploma: Master of Science from the Faculty of Medicine.

## Grading of the Master's thesis

All faculties use the same mode of assessment for evaluating the thesis. The assessment of the Master's thesis evaluation is based on a latin grading scale:

Approbatur	passed
Lubenter approbatur satisfactorily	passed
Non sine laude approbatur	passed not without praise
Cum laude approbatur	passed with praise
Magna cum laude approbatur	passed with much praise
Eximia cum laude approbatur	passed with exceptional praise
Laudatur	praised