MDP in Physical and Chemical Sciences

UTU Open Week Webinar, 24 Nov 2021 (Contact: master-sci@utu.fi)

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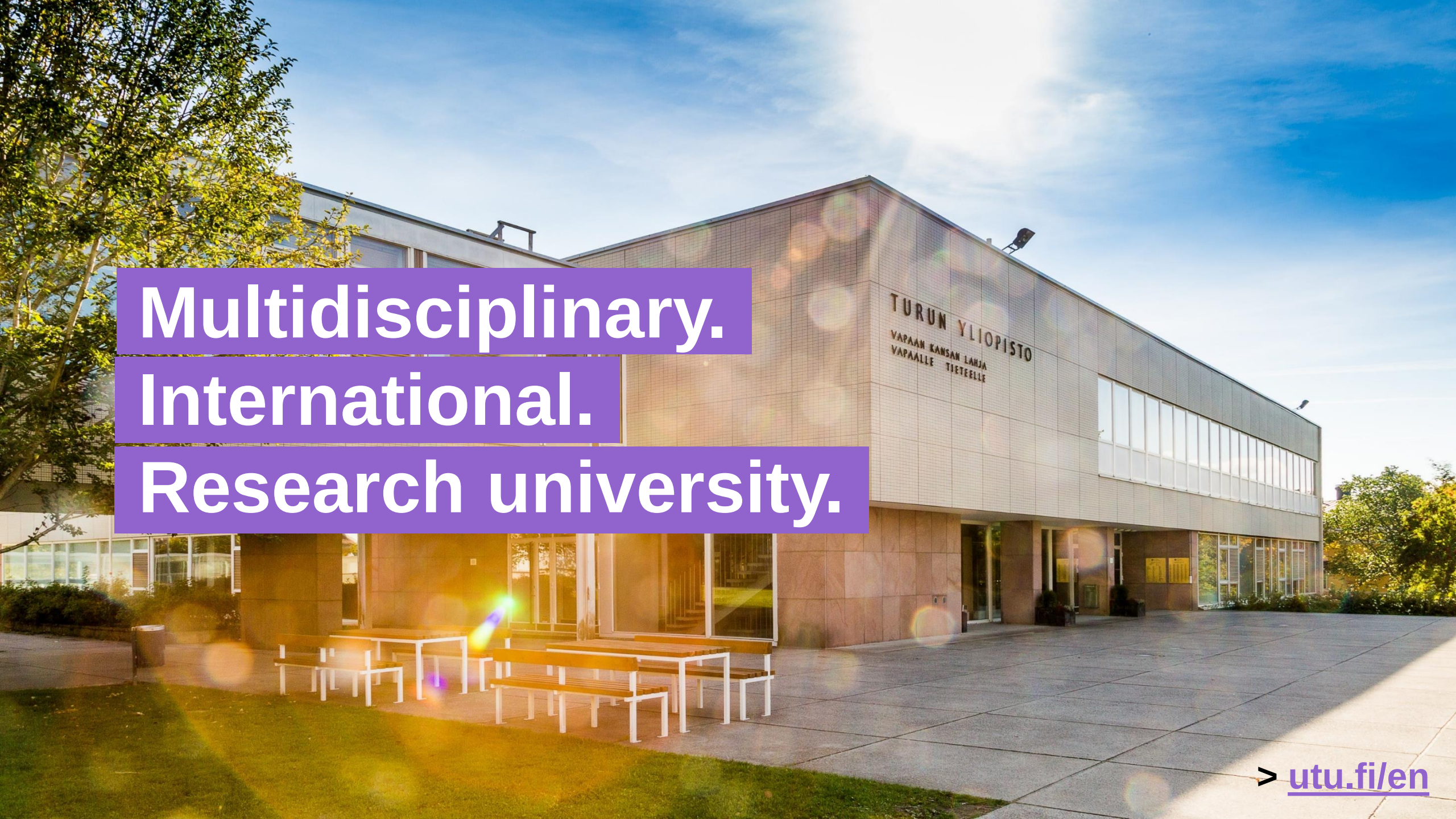
The vivid and compact Student City of Turku



Multidisciplinary.
International.
Research university.

> utu.fi/en

The University of Turku is among the top 1% in the world

QS World University Rankings 2020,
https://www.utu.fi/en/university/international-university-rankings

One of the notable alumni of the University is the president of Finland, Sauli Niinistö.

The University of Turku is an active academic community of 25,000 students and employees which conducts groundbreaking and inter-disciplinary research. We engage in the development of Finnish and international education and innovations paving the way for a brighter future.

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One of the most international universities in Finland.

20,300

students from over 100 countries

1,600

International students annually

92%

of international students are satisfied with their experience at utu.

Results: International Student Barometer by iGraduate 2017.

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General Admission Criteria

Master's Degrees

- Bachelor's Degree or other first level University degree
  - minimum 3 years in length
  - You can apply with an incomplete degree, if the proof of graduation reaches us by the beginning of August.
- Strong English language skills
  - IELTS 6.5 / TOEFL 90
  - Degree in an English-language programme in Australia, Canada, New Zealand, the United Kingdom, the United States or in an EU/EEA country
  - No exceptions will be made on the language requirements!
- All relevant enclosures must be attached to the application form within one week of the application deadline

FAQ

5 JANUARY 2022	APPLICATION TIME BEGINS
19 JANUARY 2022	APPLICATION TIME ENDS AT 3 PM (FINNISH TIME)
31 MARCH 2022	ADMISSION RESULTS PUBLISHED AND SCHOLARSHIPS OFFERED
15 JULY 2022	ACCEPT OFFERED STUDY PLACE BEFORE 3 PM (FINNISH TIME)
31 JULY 2022	FIRST TUITION FEE INSTALMENT
AUGUST 2022	OPTIONAL SUMMER SCHOOL, ARRIVAL & STUDENT ORIENTATION

Apply in studyinfo.fi

Tuition fee for this programme: 12,000€/year for non-EU students

Scholarships: available for the best 30 % of students, based on academic merits

For further info:
Visit www.utu.fi/degrees
Contact admissions@utu.fi
Learn more about student life: #utuambassador,
on IG and FB @uniturku

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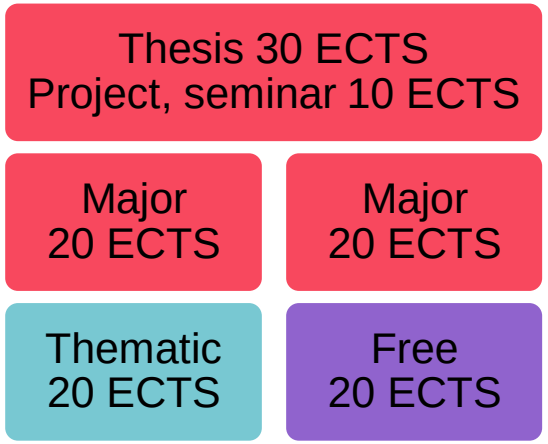
Graduation

All degrees follow the common European framework:

- Bachelor 3 years
- Master’s 2 years
- Doctoral degree 4 years

- Graduates can get a residence permit for one year to look for a job or start a business.
- Master graduates have the opportunity to apply for PhD studies in Finland or abroad.
  - In UTU application period for PhD studies twice a year.

Programme stucture



- **Master's Thesis Module (40 ECTS):**
  - MSc thesis (30 ECTS)
  - Seminars, internships, project works, etc. (10 ECTS)
- **2 Modules of main subject (2 X 20 ECTS):**
  - Core courses of the field
  - E.g. 20 ECTS of theoretical courses and 20 ECTS methodological courses
- **Thematic module (20 ECTS):**
  - Can contain main subject or related
  - Can be a solid combination of minor studies supporting the main subject or diversity of the degree
- **Freely chosen courses (~ 20 ECTS):**
  - Obligatory Finnish language and culture course (5 ECTS)
  - Freely chosen courses so that the total number of credits reaches 120 ECTS

Detailed structure: Study Guide

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Tracks

When applying, you will choose one of the following tracks:

- **Materials Physics**
- **Materials Chemistry**
- **Chemistry of Drug Development** (new in this programme)
- **Theoretical Physics**
- **Astronomy and Space Physics**

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Materials Physics

- 80 cr of major studies
  - 20 cr theory courses
  - 20 cr hands-on method courses
  - 10 cr miniproject (1st year)
  - 30 cr master's thesis
- 20 cr thematic module
  - Biomaterials
  - Electronics materials
  - Physical modelling
  - Data science
  - Any minor subject from the whole university offering
- 20 cr free module
  - Incl. 5 cr Finnish
- Study guide

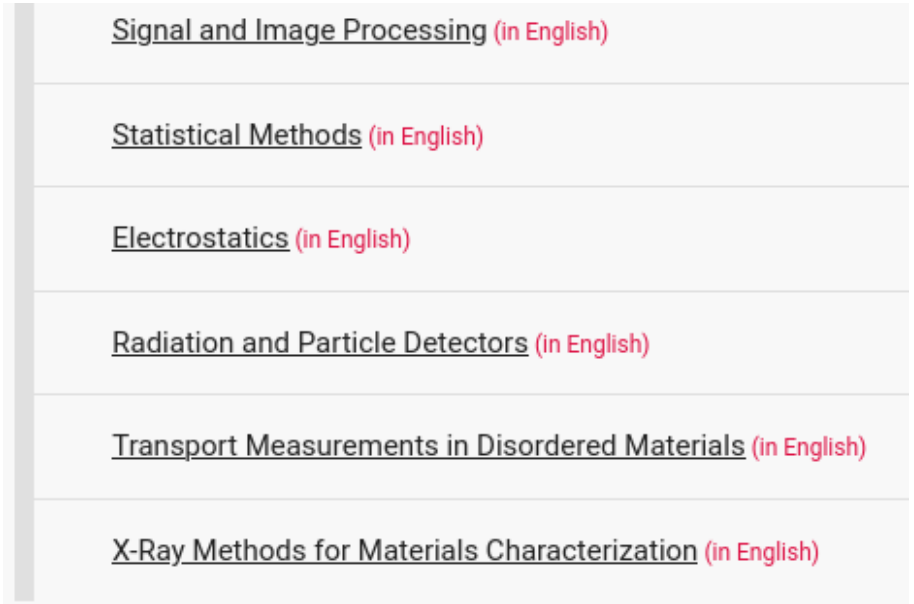
Thesis 30 ECTS
Miniproject 10 ECTS

Theory
20 ECTS

Method
20 ECTS

Thematic
20 ECTS

Free+Finnish
20 op



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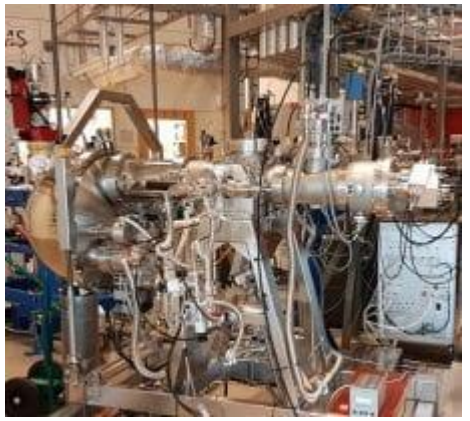
Materials Physics - Research

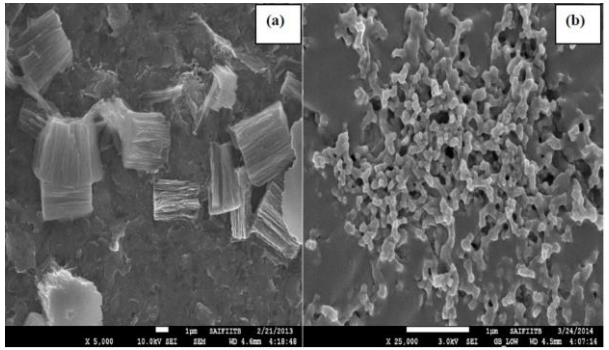


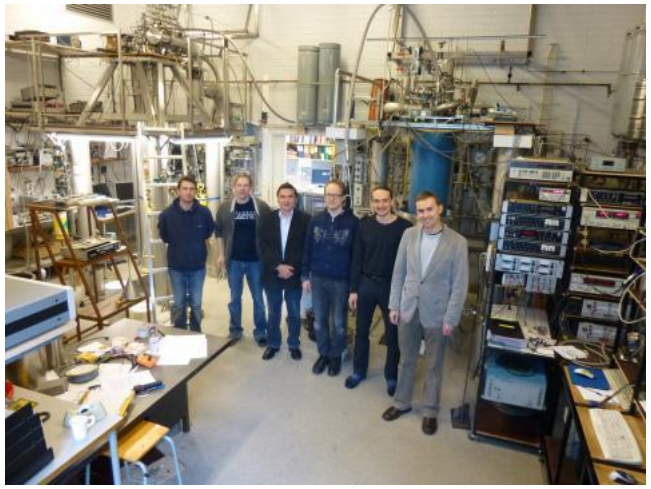
Electronics materials

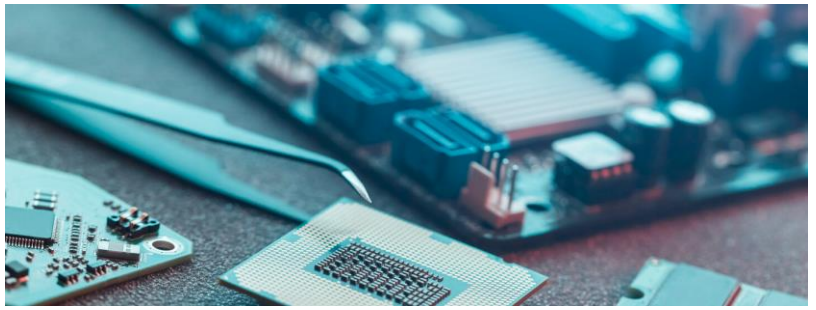
- Semiconductor surfaces
- Memristors from low band width manganites
- High temperature superconductors
- Low temperature properties of hydrogen

Biomaterials

- Porous silicon as drug carrier
- Dissociation of biomolecules with radiation







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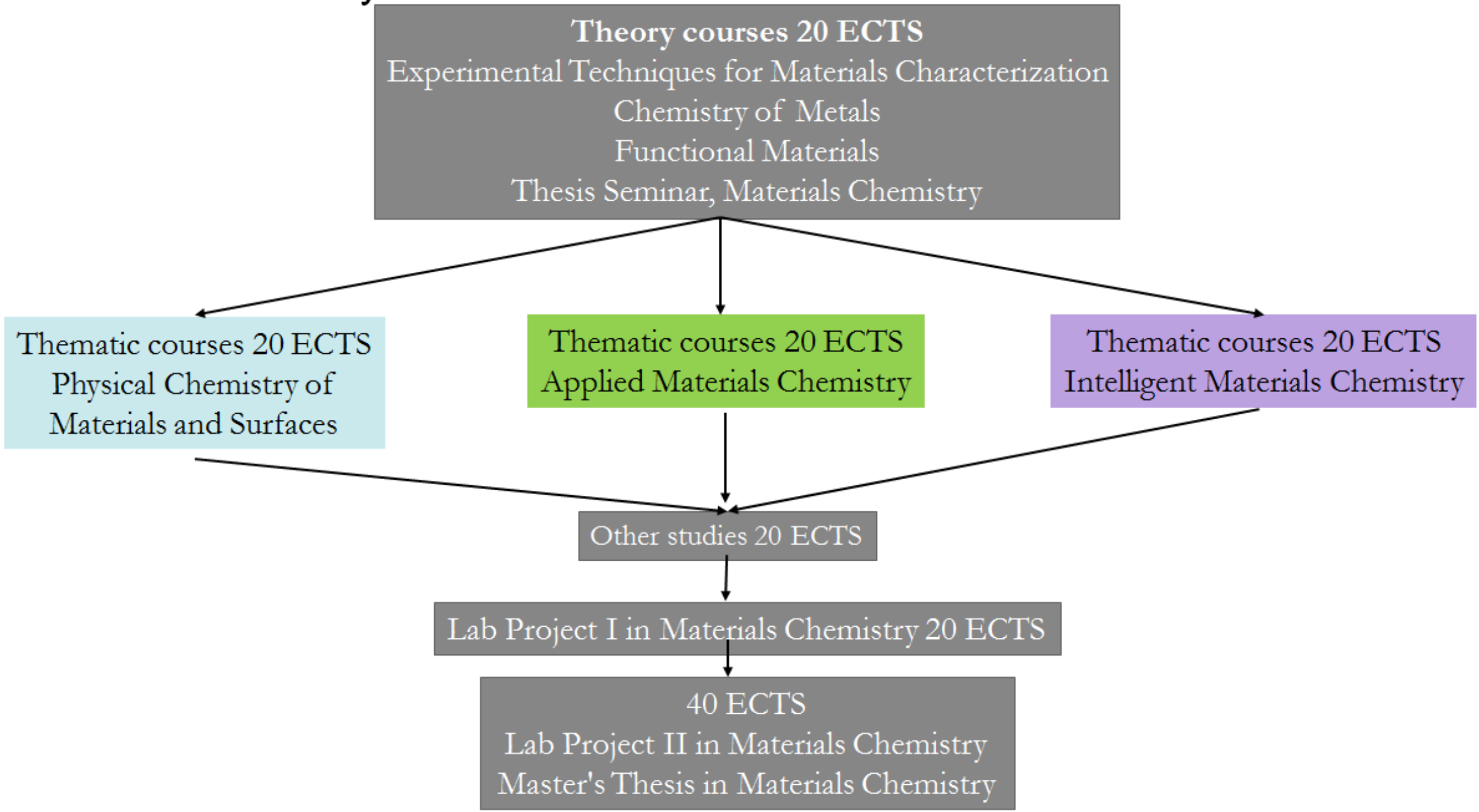
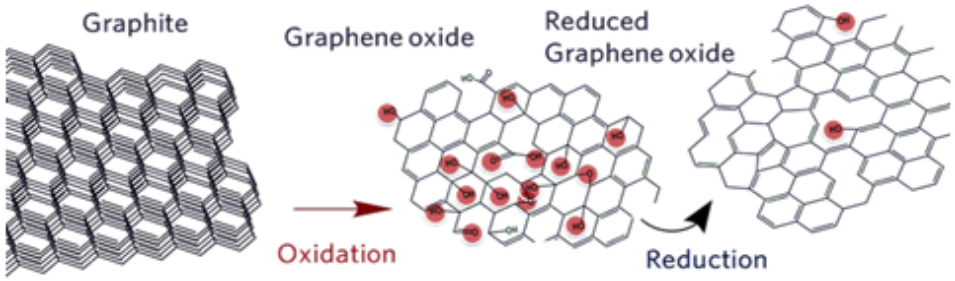
Materials Chemistry

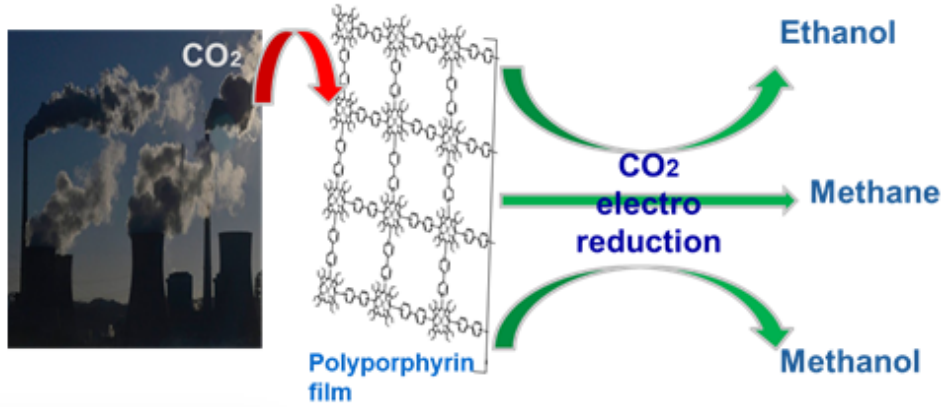


Materials chemistry - Research

Applied Materials Chemistry

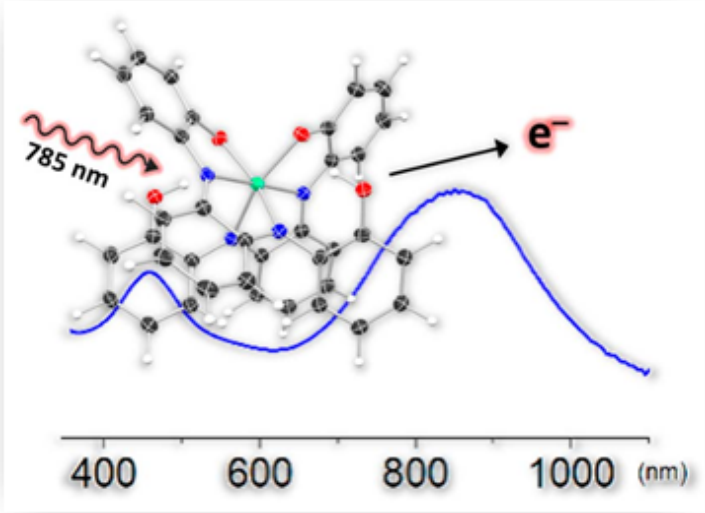
- Conducting polymers
- Graphene oxide composites
- Electrochromic materials
- Photo- and electrocatalytic materials

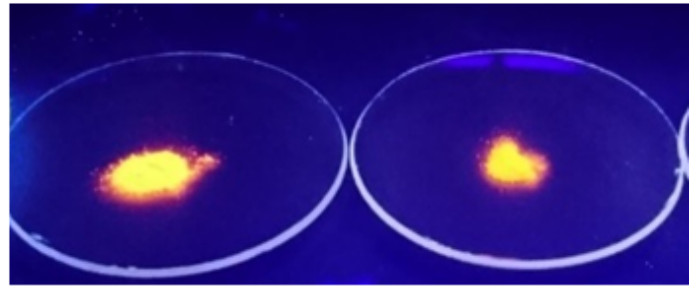




Intelligent Materials Chemistry

- Complexes with redox non-innocent ligands
- Biomimetic chemistry of transition metals
- Periodic and supramolecular metal-organic assemblies
- Photonic materials



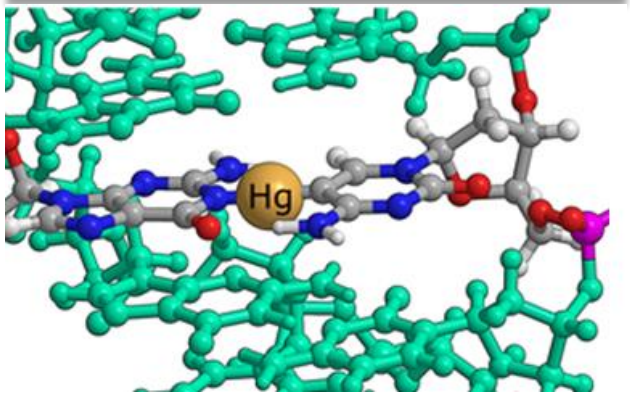


Physical Chemistry of Materials and Surfaces

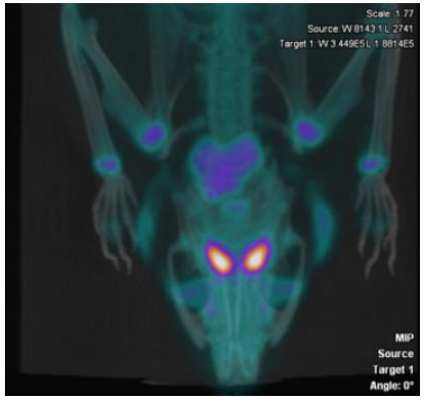
- Physicochemical properties of advance materials

Chemistry of Drug Development

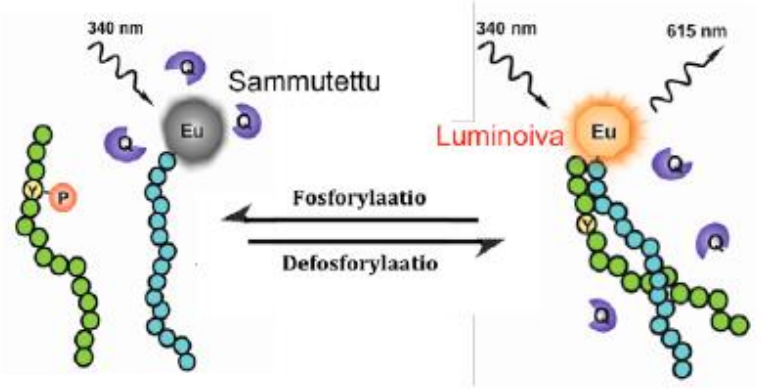
Bioorganic Chemistry



Radiopharmaceutical Chemistry



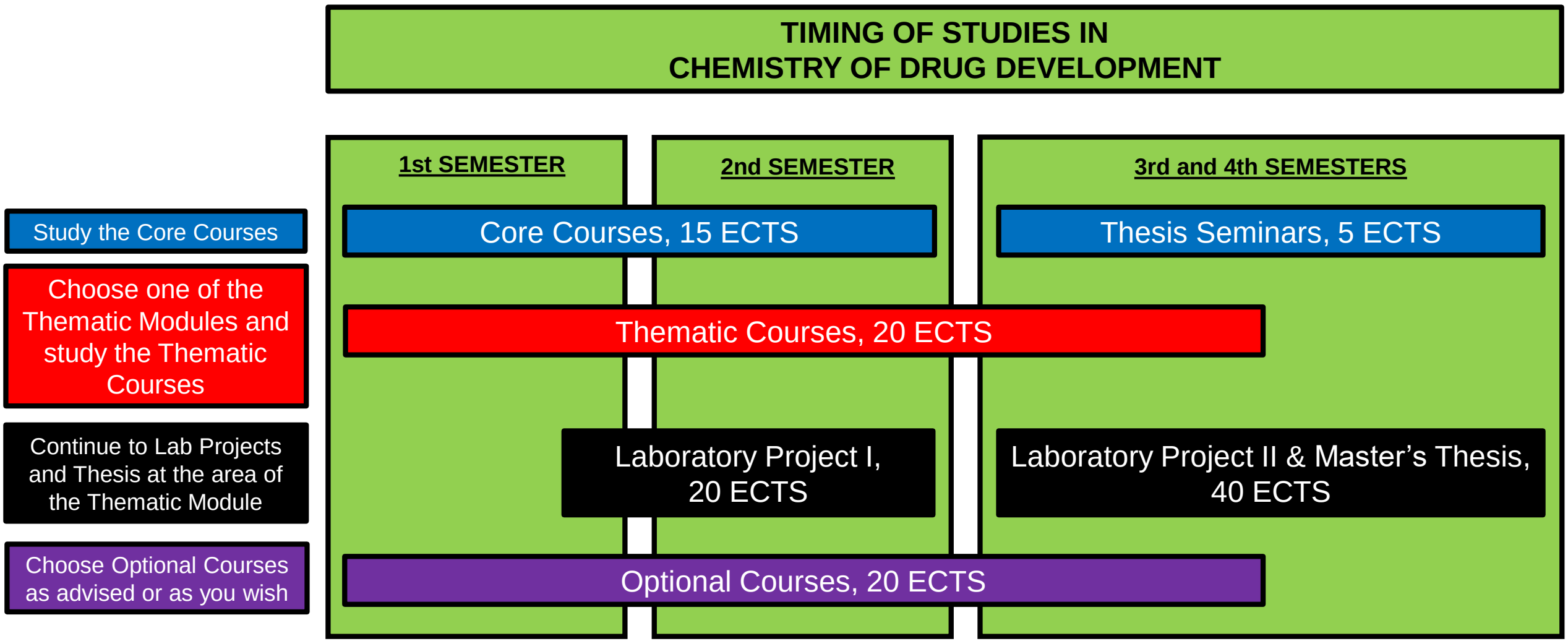
Bioanalytic Chemistry



Learn

- How potential therapeutic biopolymers (nucleic acids, peptides, oligosaccharides and their conjugates) are designed and synthesized.
- How potential radiotracers will be prepared, how biodistribution of drugs will be studied
- How potential drugs will be screened to search their bioactivity, how new analytical methods will be developed.

TIMING OF STUDIES IN CHEMISTRY OF DRUG DEVELOPMENT



Chemistry of Drug Development: Core Courses, 20 ECTS

- Structure & Reactivity I, 5 ECTS
- Bianalytic techniques, 5 ECTS
- LC-MS and its Applications, 5 ECTS
- Thesis Seminars, 5 ECTS

Thematic Courses, 20 ECTS

Bio-Organic Chemistry:

- Bioorganic chemistry, 5 ECTS
- Medicinal Chemistry, 5 ECTS
- Organic Synthesis, 5 ECTS
- Physical Organic Chemistry, 5 ECTS

Radiopharmaceutical Chemistry:

- Fundamentals of radiochemistry, 2 ECTS
- Radiosynthetic techniques, 5 ECTS
- Measuring Techniques in Radiochemistry, 8 ECTS
- Chemistry of Positron Emitting Radiodrugs, 5 ECTS

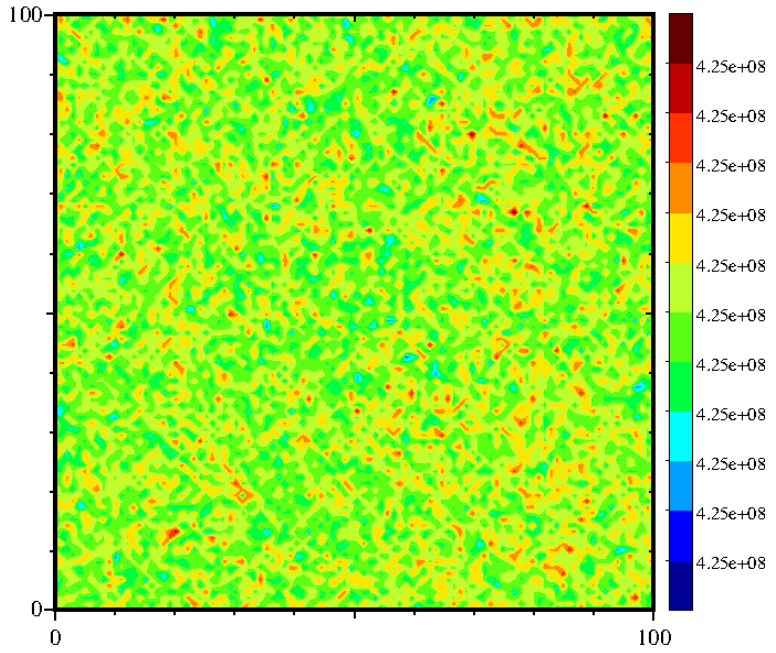
Bioanalytic Chemistry

- Structure, Activity and Quantitation Methods, 5 ECTS
- Analytic separation techniques, 5 ECTS
- Luminecense techniques, 5 ECTS
- Identification of Bioactives by UV, MS and MS/MS Spectra, 5 ECTS

Theoretical Physics

The module structure contains

- Thesis module of 40 ECTS
  - Master's thesis 30 ECTS
  - Optional supporting studies (10 ECTS) such as, project work, internship etc
- Two obligatory modules (20 ECTS each) of basic studies of central topics and tools of theoretical physics
  - Both obligatory and optional courses of theoretical physics
- Thematic module (20 ECTS) individually selected for each student according to their interests
  - May include studies on mathematics, physics, astronomy, IT, or other agreed studies
- Free module (20 ECTS)
  - Includes obligatory course Finnish for Foreigners



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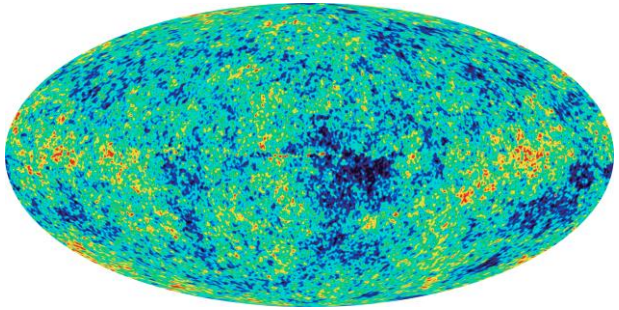
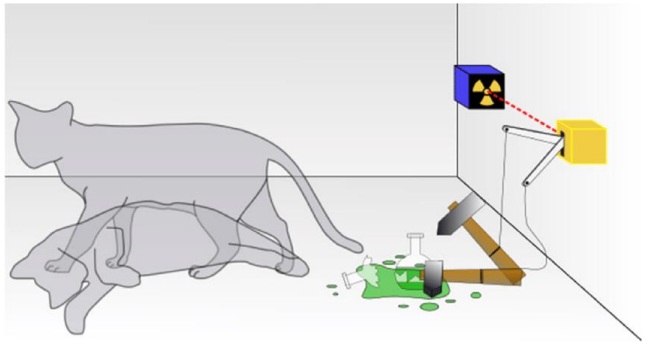
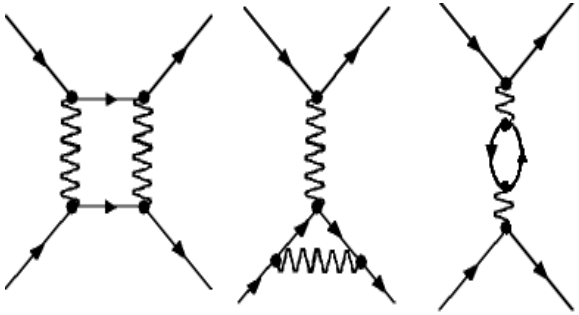
Theoretical Physics

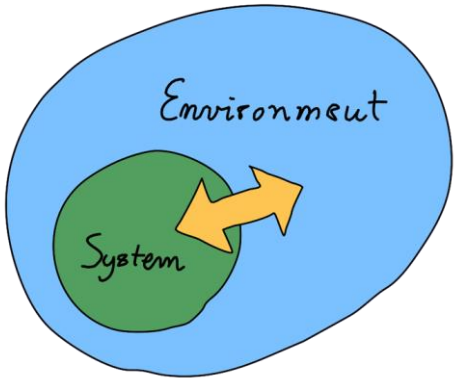


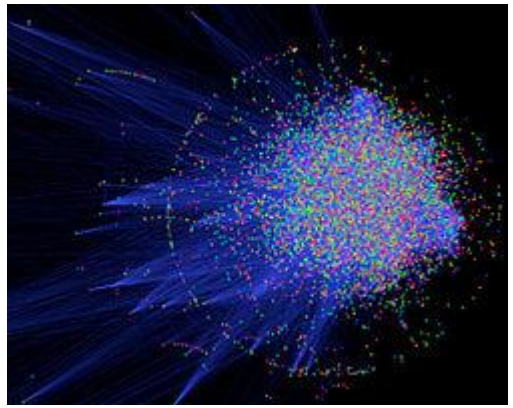
Fields of research and specialisation in Theoretical Physics includes

- Open quantum systems and network theory
  - Decoherence in open quantum systems
  - Interdisciplinary applications of networks
- Quantum field theory and cosmology
  - Quantum field theory in curved space-time
  - Phenomena of the Early universe
- Mathematical quantum physics
  - Fundamental structures of quantum physics
  - Quantum information









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Astronomy and Space Physics

The structure for the 5 modules of the 120 ECTS studies in Astronomy or Space Physics is the following:

1) 40 ECTS Master's thesis module: 30 ECTS, thesis and 10 ECTS other studies, e.g., internship or project work
2,3) Two 20 ECTS compulsory modules:
    - Theoretical courses in space sciences
    - Methodological courses in space sciences
4) 20 ECTS Thematic module that should include one of the following modules:
    - Special courses in space sciences
    - Optical instrument design and technology
    - Space technology
    - Data analytics
    - Physical modelling
5) 20 ECTS Free module, including the 5 ECTS obligatory Finnish for foreigners course.

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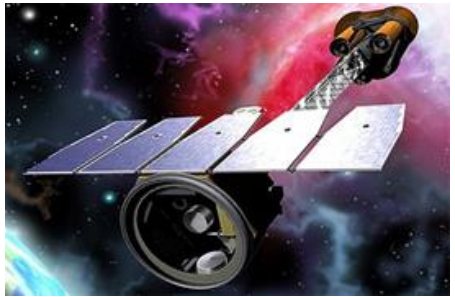
Astronomy and Space Physics

- Theoretical astronomy
  - Neutron stars
  - Black Holes
  - Cosmology
  - Solar system dynamics
- Observational astronomy
  - Supernovae
  - Tidal Disruption of stars
  - Gravitational wave sources
- Astronomical Instrumentation
- Space physics
  - Solar Eruptions
  - Solar radiation environment
  - Instruments for satellite observations



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Why choose UTU?

- Teaching based on top level research conducted with global partners. Our programmes are based on our strengths in research.
- Excellent facilities and learning environments, i. eg. libraries and IT facilities.
- Versatile teaching methods: online courses, workshops, simulations and seminars as well as contacts with local and international companies.
- Small groups and close professor-student relations.
- Personal support and student services throughout your studies.

> **10 best reasons to choose UTU**

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