Aalto University

Master's Programme
Life Science Technologies

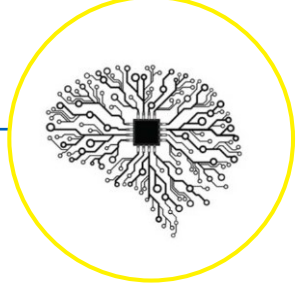
Prof. Anton Kuzyk
Director of the Life Science Technologies programme

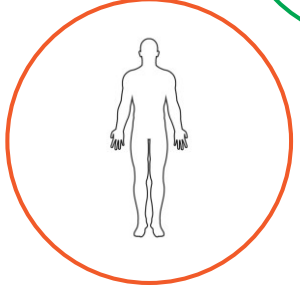
What is Life Science Technologies about?

- Life Tech programme focuses on the research and development of technologies and methodologies used in the life sciences.

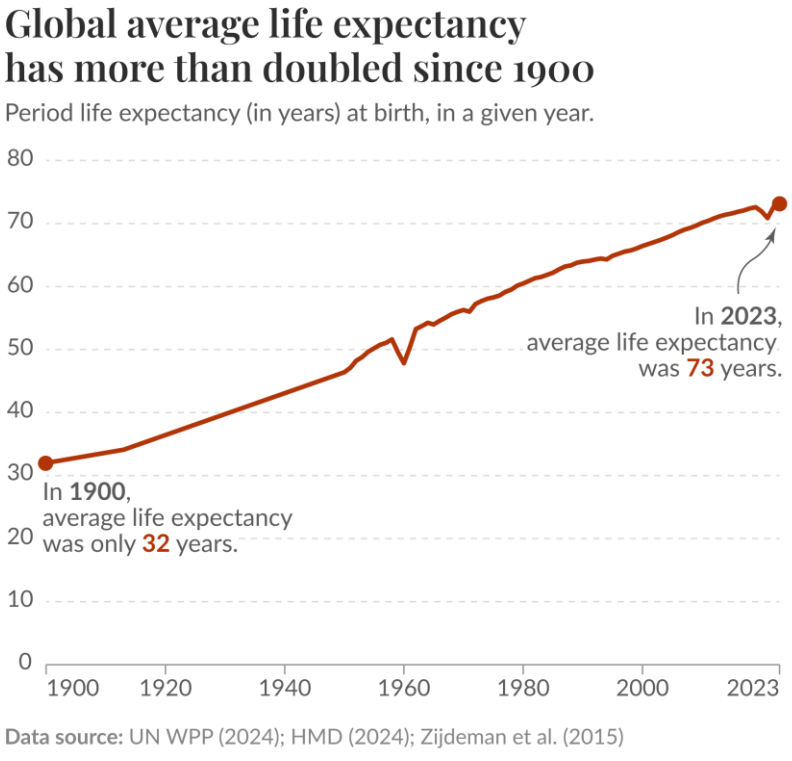
- Covers data analysis and modelling, bioinformatics, biomedical engineering, human neuroscience and neurotechnology, bioelectronics and biosensing, synthetic biology and chemistry.

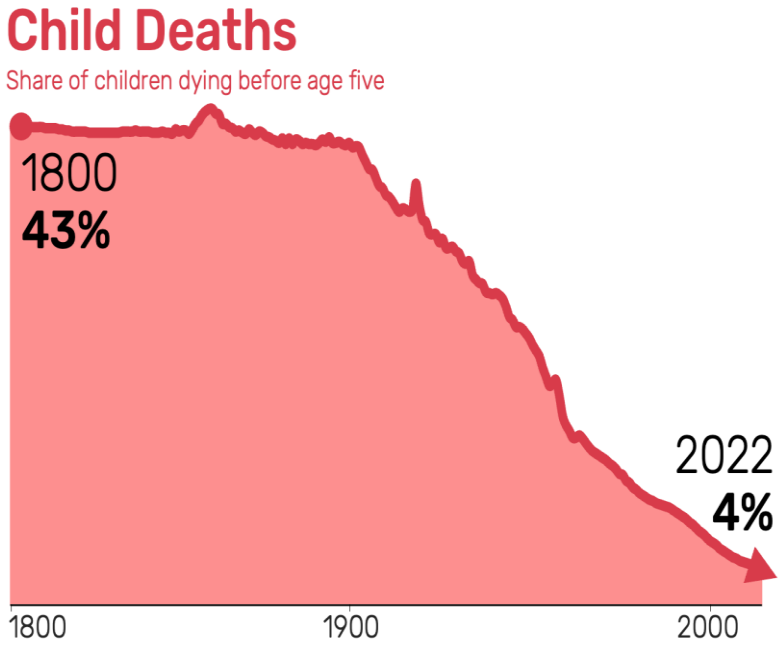
- Builds state of the art research done in Aalto.





Why is Life Science Technologies important?





Why is Life Science Technologies important?

Technological innovations have become an essential part of our lives, well-being, modern healthcare, and bioeconomy.

Why is Life Science Technologies important?

Technological innovations have become an essential part of modern healthcare, well-being and bioeconomy.

Why is Life Science Technologies important?

We need experts who can build bridges between life sciences, engineering, and computer science to develop technologies and methodologies that advance diagnostics and therapeutics, transform healthcare, and increase our understanding of complex biological systems.

Life Science Technologies in Finland

Finnish company receives EUR 300 million in funding

Companies | Medix Biochemica, a manufacturer of monoclonal antibodies and other raw materials for medical tests, has almost quadrupled its revenue under the ownership of development company Devco. The additional financing has been arranged so that the ownership remains in Finland.

September 21, 2023

Bayer made a large-scale investment in Turku – a new EUR 250 million factory was opened in the prevention capital of the world

Finnish Healthtech exports: EUR 2.58 B€ in 2024.

Life Science Technologies in Finland

Beyond health, ustainability and circular economy

Bio-based production of silk like materials

https://www.aalto.fi/en/newsilk

One programme – Three schools – Six majors

structure of the programme

Life Science Technologies

School of Science (SCI)

Bioinformatics and Digital Health	Harri Lähdesmäki
Complex Systems	Mikko Kivelä
Biomedical Engineering	Matias Palva
Human Neuroscience and Technology	Lauri Parkkonen

School of Electrical Engineering (ELEC)

Biosensing and Bioelectronics	Tomi Laurila

School of Chemical Engineering (CHEM)

Biosystems and Biomaterials Engineering	Heli Viskari

One programme – Three schools – Six majors
structure of the programme

Major 60 or 65 credits

Common courses for all majors (10 cr)

Master's thesis 30 credits

Elective studies 30 or 25 credits

- 120 ECTS credits
- Major, master's thesis and elective studies
- To be completed in two years
- Full time programme

Curriculum 2024-2026
https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/curriculum-2024-2026

Life Tech– success stories from our students

SCI MSc Thesis Awards

SCI Master's thesis award 2022

Fanni Ojala

"Bayesian Survival Analysis to Model Clearance of MRSA Colonization"

Fanni Ojala

Mikko Purhonen

"Computer-Aided Analysis of MGG-stained Bone Marrow Aspiration Samples"

Mikko Purhonen

SCI Master's thesis award 2023

Anni Hukari

"Mutual information and Pearson correlation on M/EEG time series"

Anni Hukari

https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/thesis

Aalto University

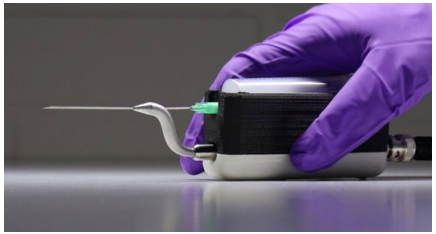
Master's Programme
Life Science Technologies

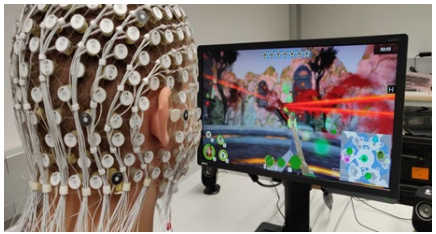
Prof. Anton Kuzyk
Director of the Life Science Technologies programme

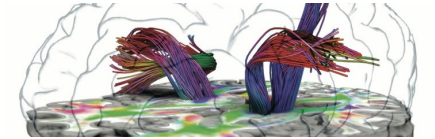
Aalto University
School of Science

Biomedical Engineering (BME)

@ Department of Neuroscience and Biomedical Engineering (NBE)







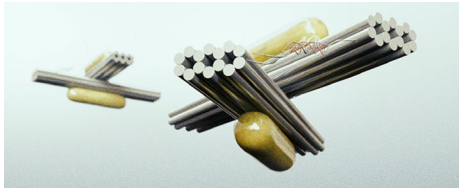
Responsible Professor:

Matias Palva

(*Deputy:* Hanna Renvall)

Responsible Teachers:

Riitta Salmelin
Lauri Parkkonen
Matti Stenroos
Stephane Deny
Mark van Gils
Anton Kuzyk
Jarmo Ruohonen
Koen van Leemput
Petri Ala-Laurila
Ari Koskelainen
Pekka Orponen
Eero Salli
Iiro Jääskeläinen
Linda Henriksson
Ilkka Nissilä
Heikki Nieminen

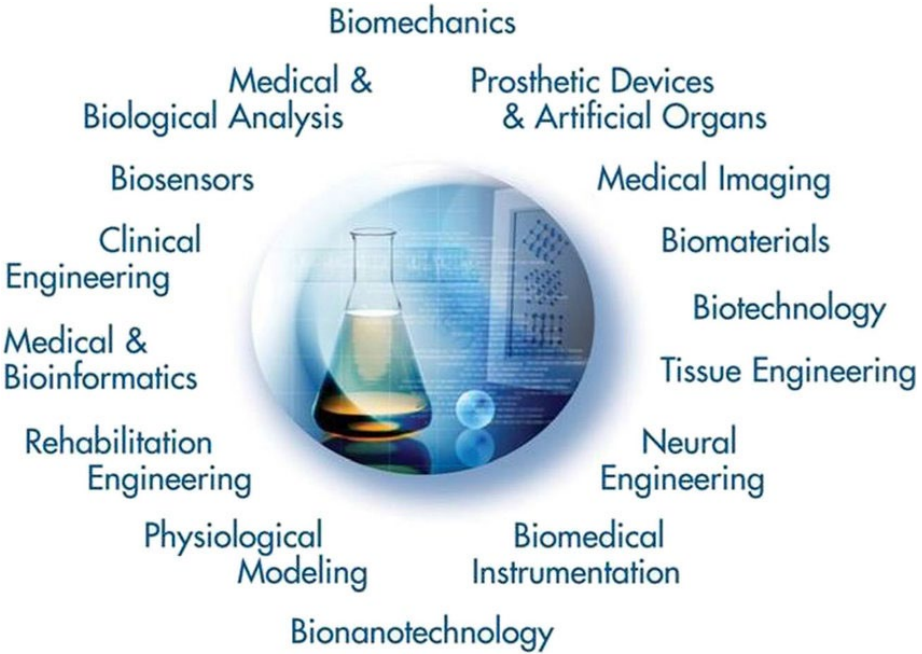


What is **BME**?

“Biomedical engineering (**BME**) is the application of engineering principles and design concepts to medicine and biology for healthcare purposes (e.g., diagnostic or therapeutic).”

https://en.wikipedia.org/wiki/Biomedical_engineering

Biomedical engineering builds on a solid basis of physics and technology to **characterize, monitor, image and influence biological systems**. [...] provides knowledge and skills for developing novel engineering solutions for **diagnostic and treatment** needs in health care.



https://into.aalto.fi/display/enlst/Biomedical+Engineering+2020-2022

BUSINESS FINLAND

NEWS 03.10.2023

FINNISH HEALTH TECHNOLOGY IS THE GOLDEN EGG OF EXPORTS THAT NEEDS TO BE NURTURED

The export of health technology products developed in Finland has grown every year over the past 20 years. This has accumulated a surplus of over 16 billion euros. The strengths of Finland's health sector have guaranteed the growth of health technology exports for several years now. This needs to be nurtured.

The growth has been based on the foundation of Finnish health care: high quality research, good education, and the availability of skilled workforce. We can go even better further when health and registry data can be properly accessed and when legislation and its interpretations support innovation and their implementation. Nor

End-to-end curriculum from fundamentals to applications

Transformation of the insight from preceding five steps into **real-world applications,** such as regulation-governed medical devices

Analysis of the results from Data Analysis: **informatics, machine learning, complex systems**, etc. approaches

Data analysis of the measured signals and Modeling the system - what kind of inferences about the biological system and its state can be made?

Physics and Mathematics of how the biological signals are made observable with **measurement devices OR** how they can be manipulated by **stimulating devices**

Chemistry, Physics, etc. of how the **biological signals** are generated by the system

Biology & Physiology + Physics & Mathematics: foundational understanding of the to-be-studied **biological system**

Compulsory & Optional course quotas

Compulsory common courses of the programme (10 credits)

Compulsory courses of the major (15 credits):

Basics of Biomedical Data Analysis (5 ECTS)
Special Assignment (10 ECTS)

Optional courses of the major (choose 40 credits in total):

Theme 3 Informatics and Applications
(choose at least 5 ECTS)

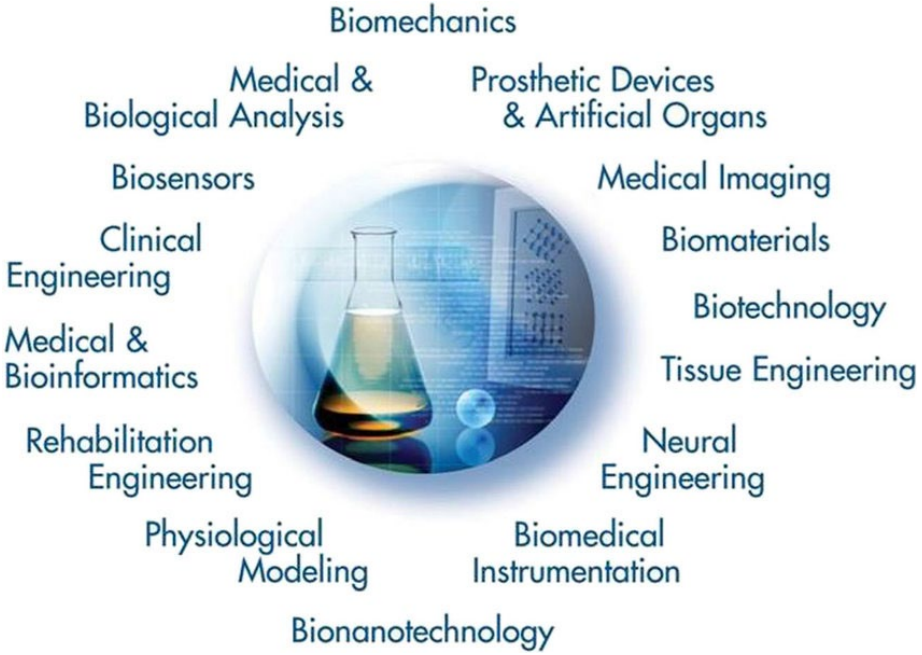
Theme 2 Measurement, Manipulation, Modeling, and Analysis
(choose at least 10 ECTS)

Theme 1 Foundations in physiology and physics
(choose at least 10 ECTS)

+ Optionals

Thank you!

Contact: matias.palva@aalto.fi



BME Intended Learning Outcomes

After completing the Biomedical Engineering major, the students should be able to:

- Demonstrate understanding of the biology-, physiology-, and physics-based foundations of systems relevant for biomedical engineering
- Exhibit understanding of generative mechanisms and measurement methods of biological signals and approaches for manipulation of biological systems
- Apply and implement data pre-processing and analysis methods on biomedical data with understanding of how they describe the underlying biological phenomena.
- Understand and apply computational modeling methods for simulating the biomedical systems of interest
- Understand the prospects and limitations of informatics and machine learning methods to biomedical data as a foundation for development of medical devices and applications
- Create, evaluate, or analyze biomedical solutions in the context of the regulatory paths and stakeholders that differentiate them from health and wellbeing devices

Curriculum - Compulsory

Code	Course name	ECTS	Period/Year
Compulsory common courses of the programme (10 credits):			
JOIN-E3100	Life Science Technologies Project Course A	2	I/1
JOIN-E3200	Life Science Technologies Project Course B	8	III-V/1
Compulsory courses of the major (15 credits):			
NBE-E4070	Basics of Biomedical Data Analysis	5	I-II/1
NBE-E4600*	Special Assignment*	10	I-summer/1

Optional courses of the major (choose 40 credits in total)

Theme 1 Foundations in physiology and physics (choose at least 10 credits)

NBE-E4100	Molecular Biophysics	5	III-V O
NBE-E4120	Cellular Electrophysiology	5	I-II E
NBE-E4210	Structure and Operation of the Human Brain	5	I-II/1 or 2
NBE-E4060	Bioelectromagnetism: Fundamentals, Modelling and Application	5	I-II/ 2 or 1

Theme 2 Measurement, Manipulation, Modeling, and Analysis (choose at least 10 credits)

NBE-E4010	Medical Image Analysis	5	I-II ~~O~~ / 1 or 2
NBE-E4020	Medical Imaging	5	III-IV E
NBE-E4045	Functional Brain Imaging	5	I-II/2
NBE-E4250	Mapping, Decoding and Modeling the Human Brain	5	III/ ~~1 or 2~~ O
NBE-E4260	Genesis and Analysis of Brain Signals	5	III-IV/1 or 2
NBE-E4310	Biomedical Ultrasonics	5	I-II O
NBE-E4150	DNA Nanotechnology	5	I-II/2

Theme 3 Informatics and Applications (choose at least 5 credits)

NBE-E4080	Decision Support in Healthcare	5	II / 1 or 2
NBE-E4085	Behavioral Health Informatics	5	IV / 1
NBE-E4300	Medical Device Innovation	5	III-V / 1
NBE-E4305	Biodesign — Innovating Medical Technologies in Multidisciplinary Teams	5	V / 1

Optional (+ suitable courses from other LST majors)

NBE-E4130	Information Processing in Neural Circuits	5	III-V O	
NBE-E4140	Neurophysics	5	IV-V E	
ELEC-E8739	AI in health technologies	5	I-II / 1 or 2	Recommended year added
NBE-E4540	Special Course in Biomedical Engineering**	2 - 5		Added range of variation (2 -) and additional information that the course is organised occasionally

Aalto University
School of Chemical
Engineering

Master's Programme in Life Science Technologies

Biosystems and Biomaterials Engineering Major

Head of Major
Heli Viskari

By using **problem-based learning**, the major supports the developments of skills and tools for **solving the complex problems encountered within the fast-changing field of life sciences**. Furthermore, the major supports the development of transferable skills such as organizing personal and teamwork, working as part of a team, and effective communication of scientific knowledge to a forum of peers and experts and to the general public.

The major is designed to give graduates broad training and in-depth knowledge, **combined with practical experience**.

Starting from the understanding of basic biological phenomena, three distinct tracks link biosciences with information technology, chemistry and biomaterials allowing students to work at the interfaces of these different fields.

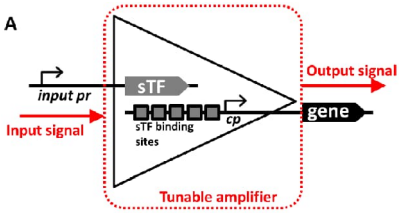
Knowledge & skills for addressing our most urgent challenges

Complex problems require multidisciplinary approaches

Biosystems Engineering

Design of genetic circuits and cellular pathways by using genetic engineering and synthetic biology tools

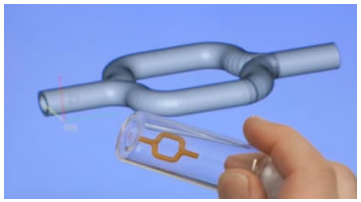
Computational methods for analysis of biological high-throughput data, understanding the underlying statistical and computational concepts



Biomaterials

Synthesis of synthetic and biopolymers using chemistry, enzymes or cells and identification of suitable methods for their characterization

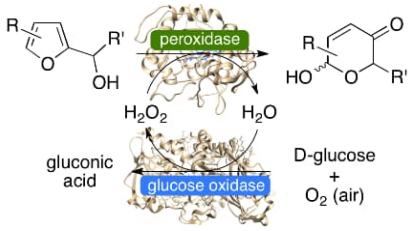
Understanding of molecular level phenomena and biophysical properties of materials and their implications on e.g. biomedical applications



Chemistry of Life

Knowledge of the fundamental concepts of organic chemistry and biology

Understanding of the reactivity of small organic building blocks, design of synthesis reactions and structure analysis, used as basis e.g. for pharmaceutical research



Parties involved from CHEM

- Department of Biosystems and Bioproducts (Bio2)
  - ➢Biosystems Engineering (Biotechnology)
- Department of Chemical and Metallurgical Engineering (CMET)
  - ➢Biomaterials (Polymer science)
- Department of Chemistry and Materials Science (CMAT)
  - ➢Chemistry of Life (Chemistry related courses)

The Biochemistry group (Prof. Silvan Scheller) develops biotechnological routes to convert CO2 to renewable fuels.

The Biohybrid Materials Group (Prof. Mauri Kostiainen) does research at the interface of chemistry, physics and biochemistry. The long-term aim is to integrate biological and synthetic building blocks in a designed manner to combine the versatility of synthetic materials and highly controlled assembly properties of biomolecules. Of special interest are DNA nanostructures, virus particles and other protein cages that can be repurposed for materials science applications.

The Biomolecular Materials group (Prof. Markus Linder) seeks to understand and utilize biological design strategies for materials. In many cases nature serves as an inspiration for how high-performance materials can be designed. Examples of such materials are the mineralized structures in seashells, silk fiber, and the adhesives of many marine organisms.

The Cellular engineering group, (Assistant Prof. Sesilja Aranko) aims to expand the repertoire of post-translational protein modifications. Particular interest is in modifying proteins relevant for biomaterials, including silk- and collagen-proteins, with the aim of developing novel sustainable yet high-performing biomaterials.

The Enzyme Technology group (Prof. Miia Mäkelä) research focuses on the enzymatic degradation and conversion of wood and other plant biomass to develop sustainable solutions for valuable bioproducts. One of the key interests is the discovery and engineering of new enzyme candidates from the wealth of fungal genome data.

https://www.aalto.fi/en/department-of-bioproducts-and-biosystems

Biosystems and Biomaterials Engineering Major

Compulsory studies of 30 ECTS and three distinctive tracks

Code	Course name	ECTS	Period/Year
JOIN-E3100	Life Science Technologies Project Course A	2	I / 1
JOIN-E3200	Life Science Technologies Project Course B	8	III-V / 1
CHEM-E3190	Metabolism D	5	I / 1
CHEM-E8110	Laboratory Course in Biosystems and Biomaterials Engineering	5	I-II / 1
CHEM-E8120	Cell Biology D	5	I / 1
MS-C1620*	Statistical Inference*	5	III-IV / 1

* If the student has taken this course during their bachelor's degree, the student should take an additional course from the selected track.

Track 1: Biosystems Engineering			
CS-E5885	Modeling Biological Networks	5	II/1
CS-E5875	High-throughput Bioinformatics	5	III / 1
CHEM-E3111	Cell Engineering	5	II / 1 or 2
CHEM-E8125	Synthetic Biology	5	IV-V / 1
Select two of the following courses:			
NBE-E4150	DNA Nanotechnology	5	I-II/2
CHEM-E3121	Microbial Physiology D	5	II / 1 or 2
CHEM-E2165	Computer Aided Visualization and Scientific Presentation	3-5	IV-V / 1
CHEM-E8135	Microfluidics and BioMEMS D	5	III-IV / 1

Biosystems and Biomaterials Engineering Major

Track 2: Biomaterials			
CHEM-E2100	Polymer Synthesis	5	I / 1
CHEM-E2130	Polymer Properties	5	II / 1
CHEM-E3150	Biophysical Chemistry D	5	III / 1
ELEC-E8729	Biomaterials Interfaces	5	I-II / 1 or 2
Select two of the following courses:			
CHEM-E4210	Molecular Thermodynamics D	5	II/2
CHEM-E8100	Organic Structural Analysis D	5	I / 1 or 2
NBE-E4150	DNA Nanotechnology	5	I-II / 2
CHEM-E8125	Synthetic Biology	5	IV-V / 1
Track 3: Chemistry of life			
CHEM-E8100	Organic Structural Analysis D	5	I / 1
CHEM-E4170	Advanced Organic Chemistry	5	II / 1
CHEM-E8125	Synthetic Biology	5	IV-V / 1
CHEM-E4116	Synthesis Strategies and Design D	5	III / 1
Select two of the following courses:			
CHEM-E3150	Biophysical Chemistry D	5	III / 1
ELEC-E8729	Biomaterial Interfaces	5	I-II / 1 or 2
CHEM-E4230	Physical Organic Chemistry D	5	II / 2
CHEM-E4210	Molecular Thermodynamics D	5	II / 2

Future employment opportunities

Our graduates find employments in a broad range of functions & industries (Neste, Orion, Thermo Scientific, Blueprint Genetics, startups…) and in research institutions (VTT, universities)

Blueprint Genetics

TESTS

Screening Tests
Panels
Whole Exome Sequencing
Single Gene Tests
Variant Specific Testing

blueprintgenetics.com

ONEGO Bio

www.onego.bio

For us, smart protein is a piece of cake.

Animal-free egg white production is based on a safe, cost-efficient and environmentally sound technology called precision fermentation.

solarfoods.com

BOLT THREADS

boltthreads.com/technology/microsilk/

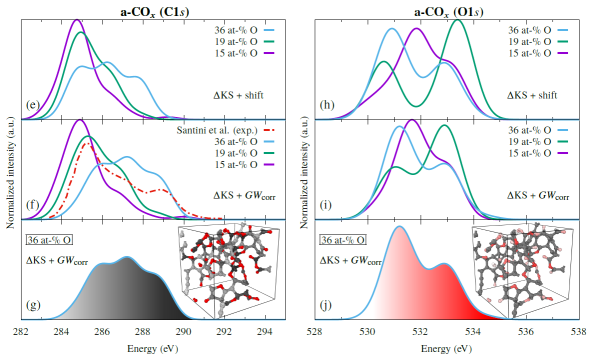
Bolt Technology—

MEET MICROSILK™

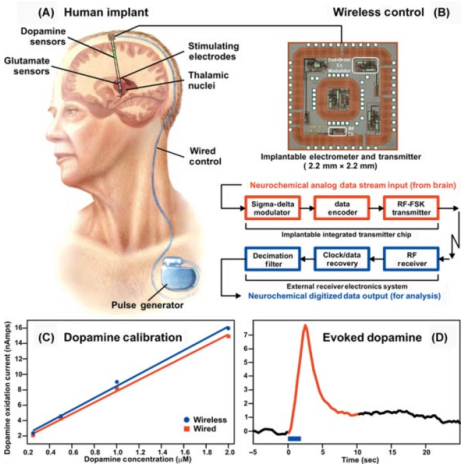
Biosensing and –electronics

FCAI Finnish Center for Artificial Intelligence

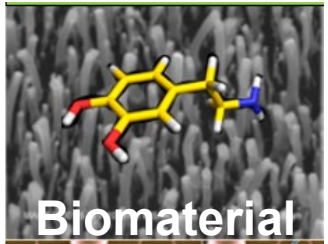
FinnCERES Materials Cluster



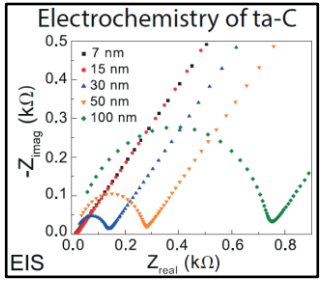
Computational studies



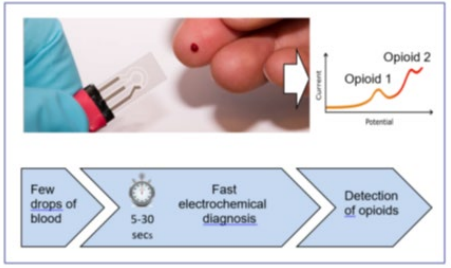
Bioelectronics



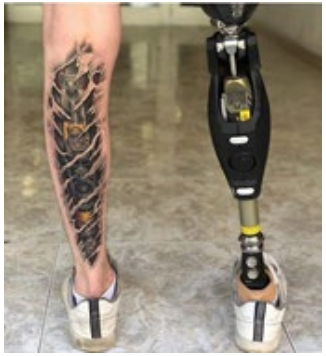
Biomaterial Interfaces



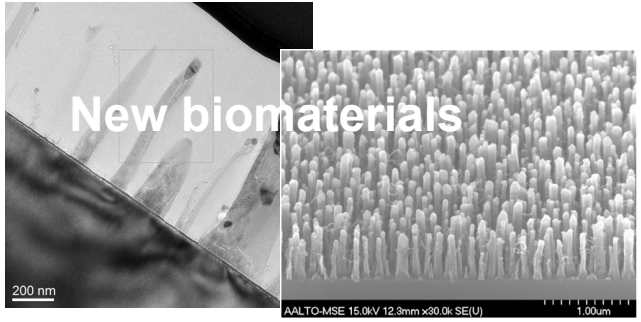
Electrochemistry

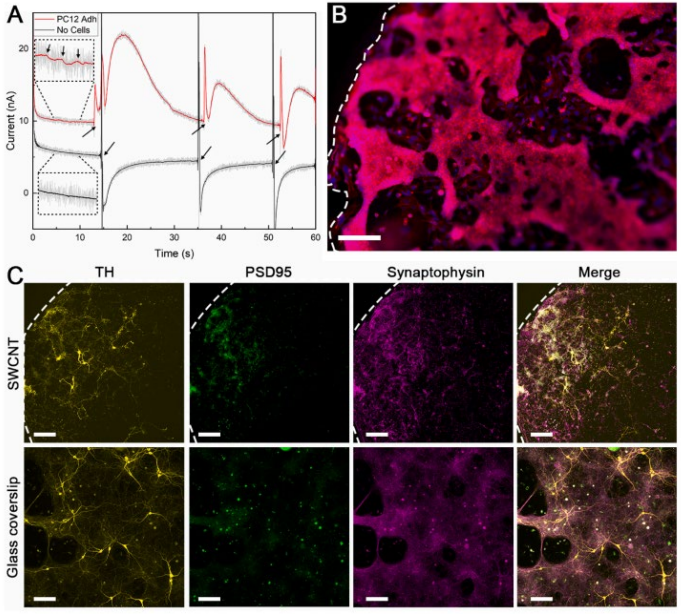


POC devices



Biorobotics





Biological measurements

Code	Course name	ECTS	Period/Year
JOIN-E3100	Life Science Technologies Project Course A	2	I/1
JOIN-E3200	Life Science Technologies Project Course B	8	III-V/1
ELEC-E8729	Biomaterial Interfaces	5	I-II/1
ELEC-E8726	Biosensing	5	III-IV/1
ELEC-E3261	Characterization of Biomolecules	5	I/1
ELEC-E8734	Biomedical Instrumentation	5	II/1

Theme 1: Signal processing in biosciences

ELEC-E8739	AI in health technologies	5	I-II/1 or 2
ELEC-E9111	Mathematical Computing	5	I-II/1 or 2
CS-E4715	Supervised Machine Learning	5	I-II/1 or 2
ELEC-E8743	Neurorobotics	5	III/1
ELEC-E8744	Electromagnetic field safety	5	III-IV/1
ELEC-E8740	Basics of Sensor Fusion	5	I-II/1 or 2

Theme 2: Micro- and nanofabrication

CHEM-E5115	Microfabrication	5	IV-V/1
CHEM-E8135	Microfluidics and BioMEMS	5	III-IV/1
ELEC-E3280	Micronova Laboratory Course	5	I-II/1 or 2
ELEC-E3220	Semiconductor Devices	5	III/1
NBE-E4150	DNA Nanotechnology	5	I-II/1 or 2
NBE-E4100	Molecular Biophysics	5	III-V O*

Theme 3: Biomaterials and electrochemistry

CHEM-E2155	Biopolymers	5	III-IV/1
ELEC-E8725	Methods of Bioadaptive Technology	5	I-II/1 or 2
CHEM-E4106	Electrochemistry P	5	III/1
NBE-E4150	DNA Nanotechnology	5	I-II/1 or 2
NBE-E4100	Molecular Biophysics	5	III-IV O*

To Whom?

- Background and interest in physics and/or chemistry as well as in electronics and materials science
- Wants to apply fundamental scientific concepts for acquiring information from and/or influencing the cells/tissues/organoids/living species behavior
- Has the desire to work also in the laboratory (computational approaches are also important)
- Translational mindset -> from lab to clinic

Biosensing and –electronics

Recent MSc theses:

- Using Machine Learning to Detect Overtraining Syndrome (2025)
- Electrochemical detection of tetracycline in milk using nanocellulose/carbon nanostructure composite electrodes (2025)
- Drop Coalescence Dynamics and Protein Interactions at the Air-Water Interface (2025)
- Stress level determination from heart rate variability measurements (2024)
- Blood Glucose Prediction Using Wearable Sensors and Dietary Logs (2024)
- Cost-effectiveness in wound care: health economic evidence generation for decision-making and public procurement (2023)

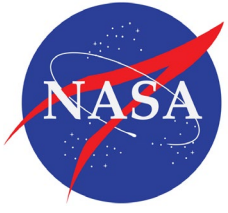
Recent PhD theses:

- Machine learning and state-space methods for healthcare, speech, and maritime awareness (2025)
- Algorithms for robust human-machine interfacing via surface electromyography (2024)
- Ultrasensitive and selective real-time detection of neurotransmitters for brain-on-a-chip applications (2024)
- Electrochemistry and Surface Properties of Nanostructured Carbon Electrodes and Interfaces (2024)
- Computationally efficient statistical inference in Markovian models (2024)

Biosensing and –electronics

Job prospectives and postgraduate studies/academic career

- ✓ Many established large companies and a SME ecosystem
- ✓ Several recent start up's from the participating groups such as Fepod etc.
- ✓ A lot of research collaboration with Universities across the globe



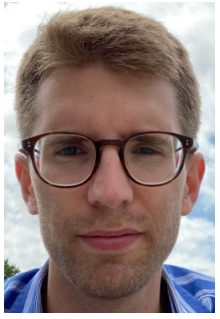
Tomi Laurila

Zachary Taylor

Stephan Sigg

Ilkka Tittonen

Esa Ollila



Filip Elvander

Biosensing and – electronics

Katsuyuki Haneda

Markus Turunen

Ivan Vujaklija

Ilkka Laakso

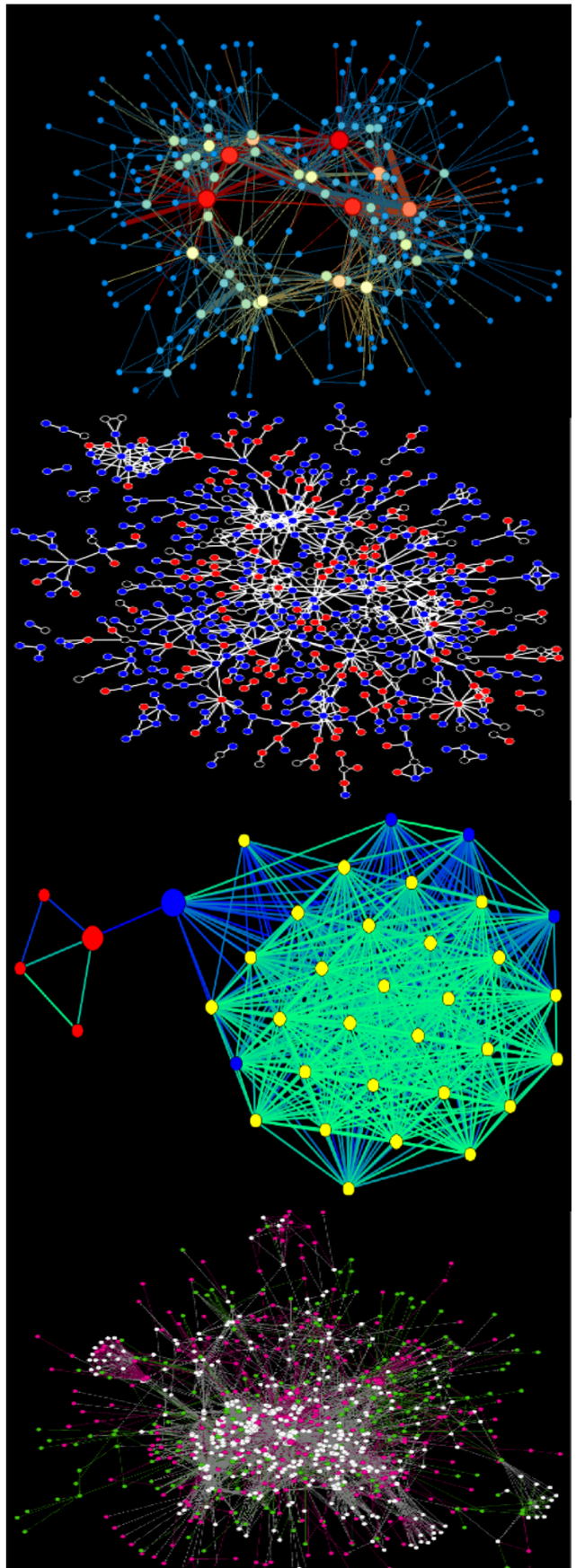
Simo Särkkä

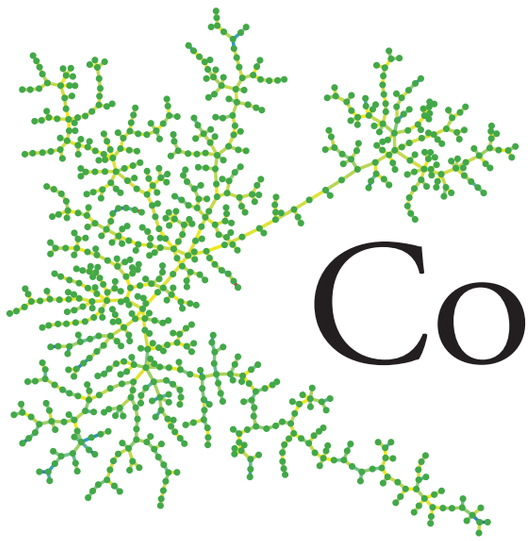
Complex systems

- Many interacting elements
- Elements interact directly with a limited subset of other elements
- Adaptive
- Evolved/evolving
- Emergent phenomena

Networks - a tool for complex systems

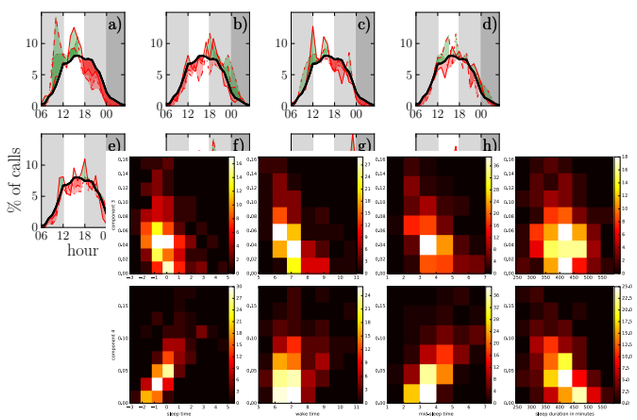
Nodes	Links
Neurons, brain areas	Synapses, axons
People	Friendships, phys. contacts, kinships, …
Species, populations individuals	Genetic similarity, trophic interactions, competition
Genes, proteins	Regulatory relationships

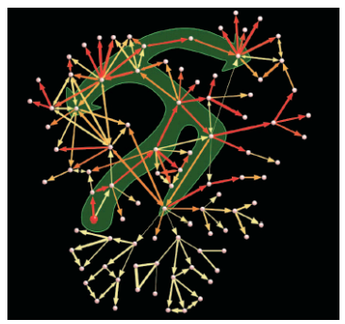


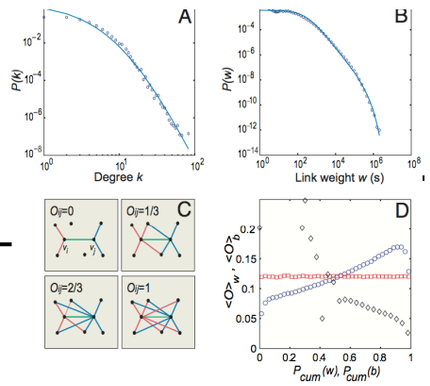


Complex Systems

The aim is to give the students **a strong computational and theoretical background** for understanding complex systems, from the human brain to a diversity of biological, technological and social systems.



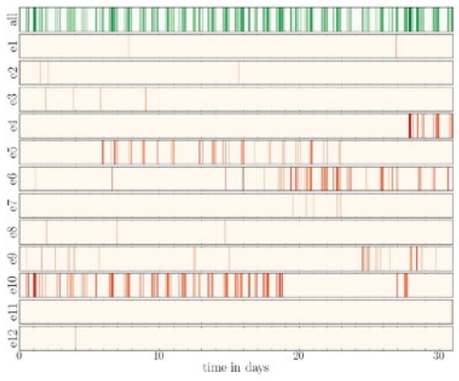




Aalto University
School of Science

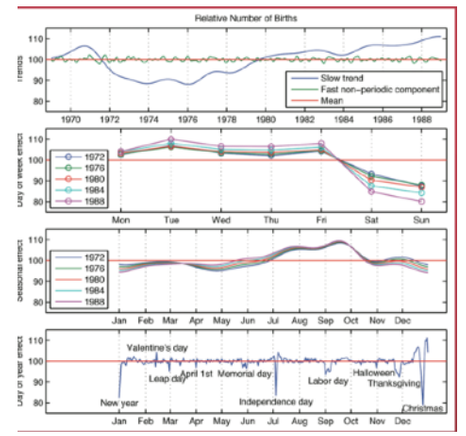
Department of Computer Science

What can you study in Complex Systems:



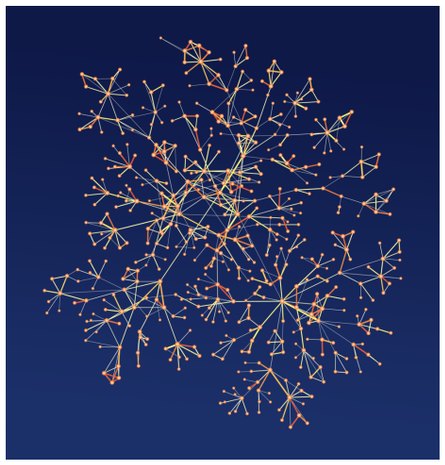
Measuring and interpreting data

data visualization, multivariate statistics



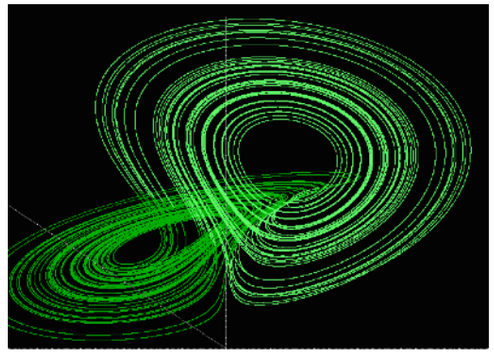
Advanced statistics and machine learning

Bayesian methods, ML fundamentals



Systems and modelling

Complex networks, chaos, etc



Application areas

The rest of Life Science Technologies

COURSES

Compulsory courses of the major (pick at least 25 credits)

CS-E5740	Complex Networks (recommended)	5	I-II/1
CS-E5775	Complex Systems (recommended)	5	I/1
CS-E5795	Computational Methods in Stochastics	5	I-II/1
MS-C2111	Stochastic Processes	5	II/1
CS-E5745	Mathematical Methods for Network Science	5	III/1
MS-E2112	Multivariate Statistical Analysis	5	III-IV/1
CS-E5755	Nonlinear Dynamics and Chaos	5	III-IV/1
CS-E5700	Hands-on Network Analysis	5	IV-V/1

Choose rest from these:

Theme 1: Systems and applications

CS-E5885	Modeling Biological Networks	5	II/1
MS-E1603*	Random Graphs and Network Statistics*	5	V/1
CS-C4100	Digital Health and Human Behaviour	5	II/1 or 2
CS-E4730	Computational Social Science	5	IV-V/1

Theme 2: Theory

MS-E1603*	Random Graphs and Network Statistics*	5	V/1
MS-E1050	Graph Theory	5	I/1 or 2
CS-E4565	Combinatorics of Computation	5	V/1
MS-E1052*	Combinatorial Network Analysis	5	II/2

Theme 3: Data science

CS-E4840	Information Visualization	5	IV/1
CS-E4715	Supervised Machine Learning	5	I-II/2
CS-E5710	Bayesian Data Analysis	5	I-II/1
CS-E4650	Methods of Data Mining	5	I-II/1 or 2
CS-E4890	Deep Learning	5	III-IV/1
CS-E4640	Big Data Platforms	5	III-IV/1

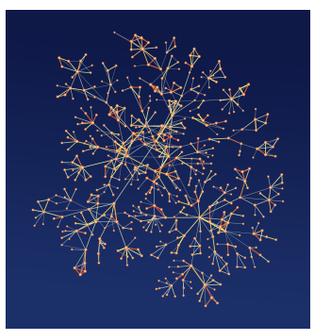
Theme 4: Special courses

CS-E5780**	Special Assignment in Complex Systems**	5-10	
CS-E5770	Special Course in Complex Systems	1-10	I-II/1 or 2, or III-summer/1

Theme 5: Courses from other Life Science Technologies majors

Pick any courses from other Life Science Technologies majors.

Students can suggest other application areas: economics, social science, etc.



Keywords:

Network science | Machine learning | Data Science | Nonlinear Dynamics

MSc theses this year completed at:

University of Helsinki
Aalto University
HUS
Oura
GE healthcare
UPM-Kymmene

Human neuroscience and -technology

Abbreviation: NEURO
Code: SCI3061

Responsible professor: Lauri Parkkonen
(F351, Otakaari 3)

Deputy: Senior Univ. Lecturer Linda Henriksson
(F341c, Otakaari 3)

Main themes

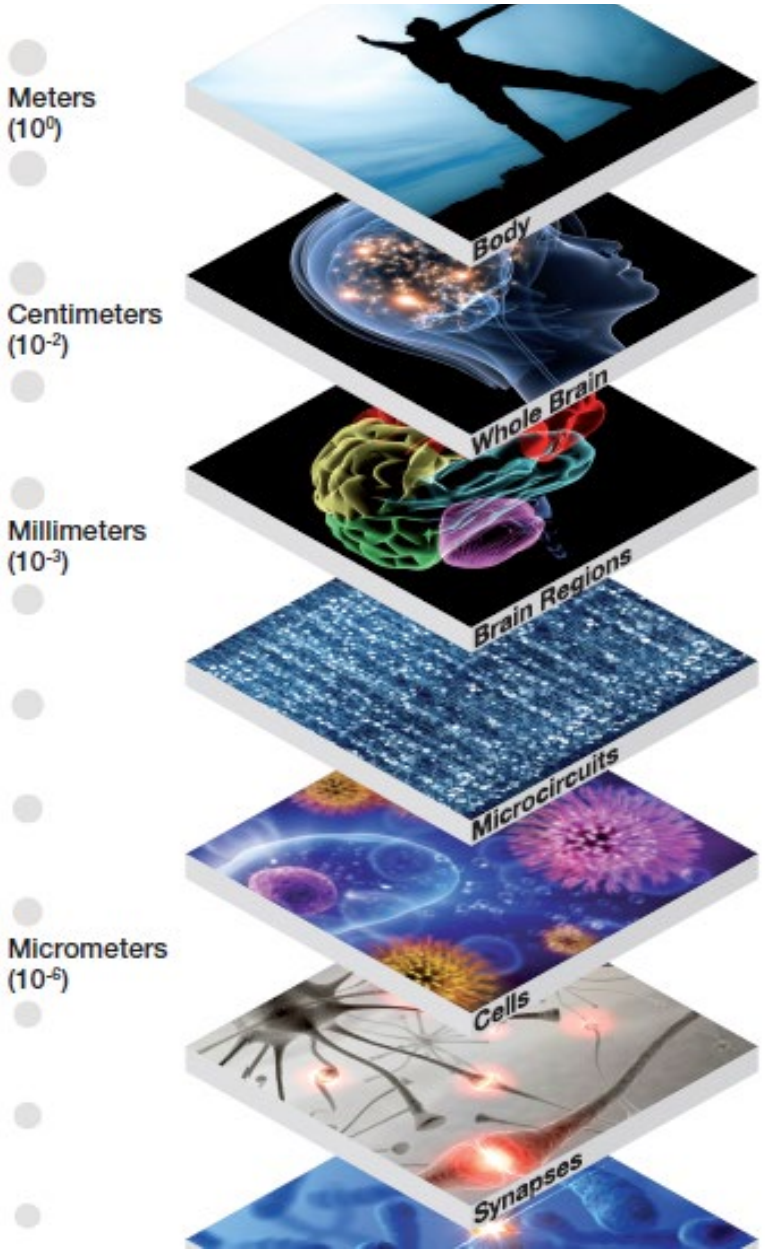
- Structure and function of human brain
- Brain research methods
- Neurotechnologies

Courses in …

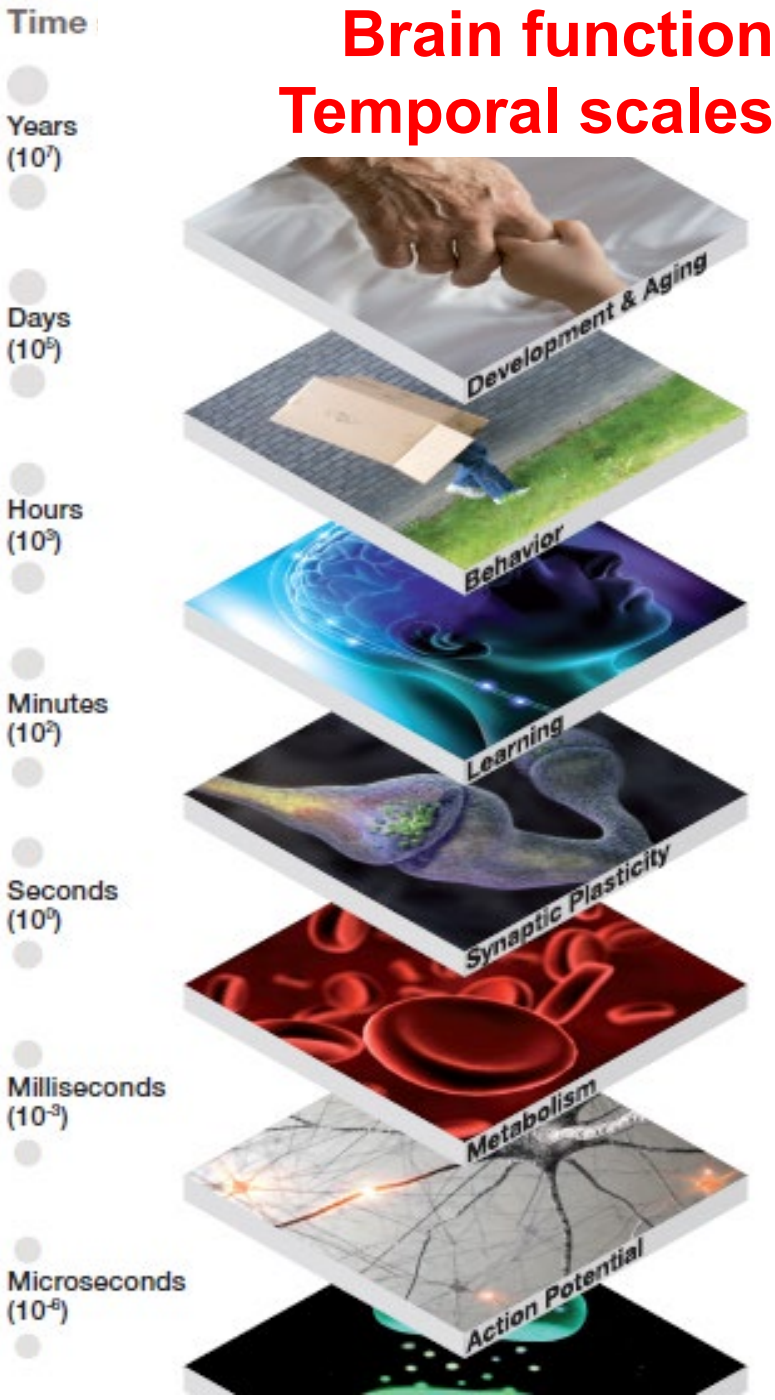
- Neuroscience
- Statistical methods and modeling
- Brain imaging
- Neurotechnology

Teaching based on research!

Brain structure
Spatial scales

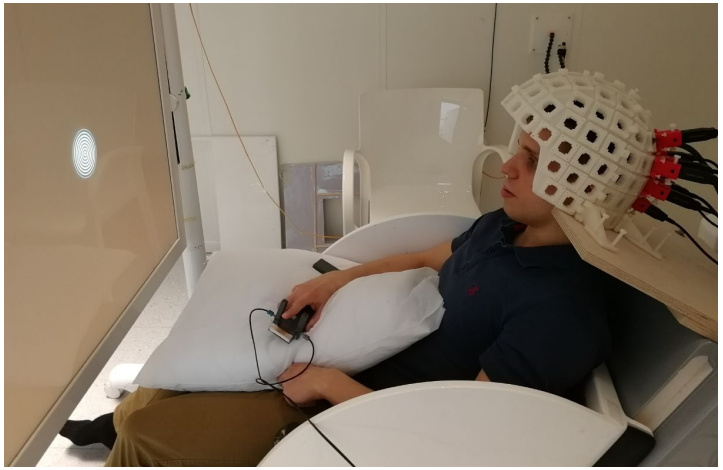


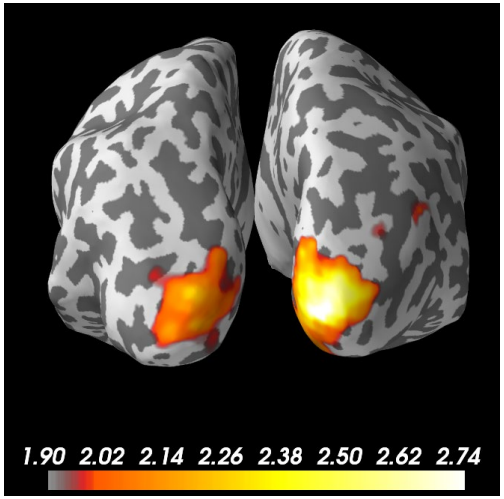
Brain function
Temporal scales



Development of brain imaging: Examples

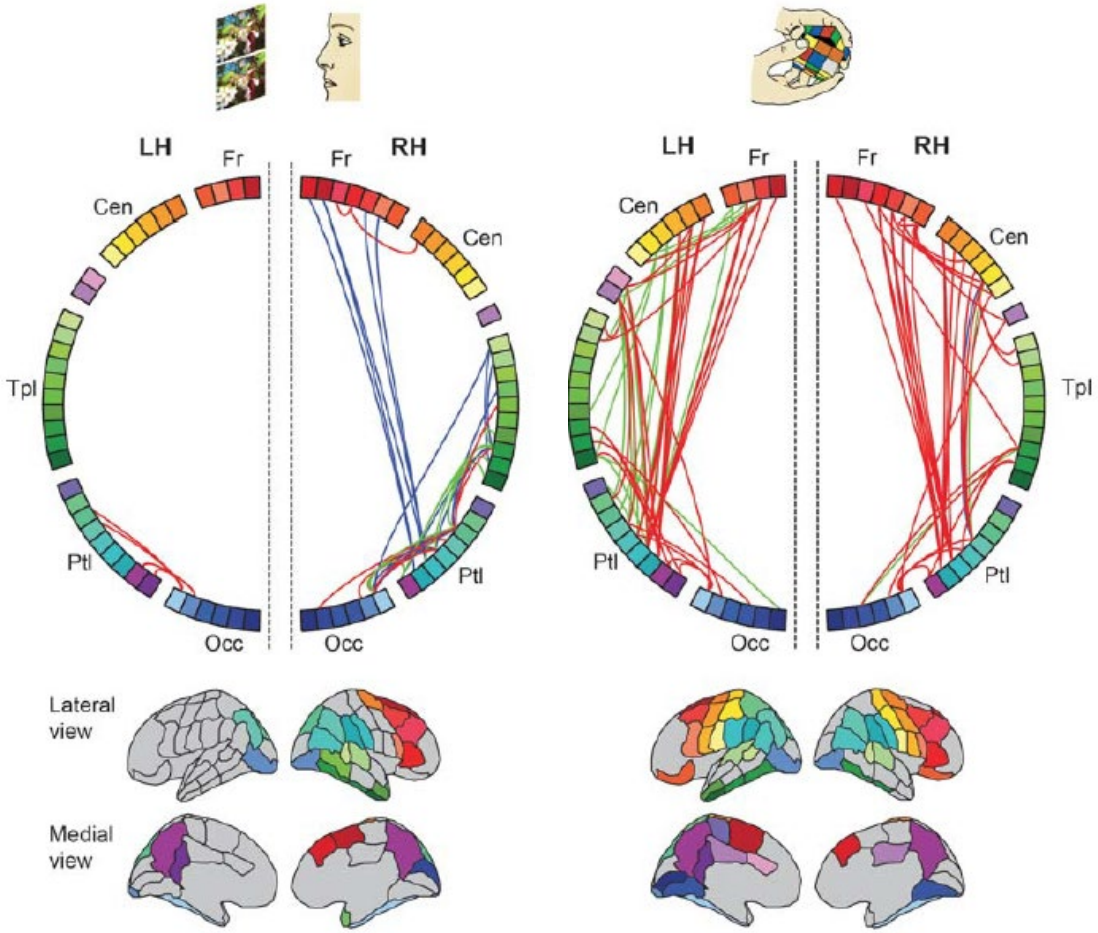
Instrumentation: Quantum optics for brain measurements





Iivanainen et al. 2019

Analysis methods: Estimating functional connectivity between brain regions



Saarinen et al. 2015

Teachers

Professors

Lauri Parkkonen (responsible)

Petri Ala-Laurila (adj. prof.)

Matti Hämäläinen

Stephane Deny

Risto Ilmoniemi (emeritus)

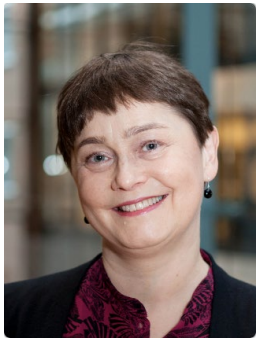
Lecturers

Linda Henriksson (NEURO)

Iiro Jääskeläinen

Matias Palva

Hanna Renvall



Riitta Salmelin

Koen van Leemput

Matti Stenroos (BME)

Structure of the major

Common LifeTech courses (compulsory; 10 credits)

JOIN-E3100	Life Science Technologies Project Course A
JOIN-E3200	Life Science Technologies Project Course B

Neuroscience and imaging (all compulsory; 30 credits)

NBE-E4210	Structure and Operation of the Human Brain
NBE-E4225	Cognitive Neuroscience
NBE-E4240	Advanced Course on Human Neuroscience
NBE-E4045	Functional Brain Imaging
NBE-E4600	Special Assignment

Analysis and modelling (select 15–20 credits)

NBE-E4070	Basics of Biomedical Data Analysis
NBE-E4260	Genesis and Analysis of Brain Signals
NBE-E4060	Bioelectromagnetism: Fundamentals, Modelling and Application
CS-E5710	Bayesian Data Analysis
CS-E4710	Machine Learning, Supervised methods
CS-E5740	Complex Networks

Structure of the major

Supporting courses (select 5–10 credits)

UH NEU-104	Integrative neurobiology (course at Univ. of Helsinki)
NBE-E4120	Cellular Electrophysiology
NBE-E4130	Information Processing in Neural Circuits
NBE-E4010	Medical Image Analysis
NBE-E4020	Medical Imaging
NBE-E4300	Medical Device Innovation
NBE-E4305	Biodesign–innovating medical technologies …
NBE-E4250	Mapping, Decoding and Modeling the Human Brain
UH NEU-521	Basic mechanisms of nervous system diseases (UH)

Master's thesis (30 credits)

Elective studies (20–30 credits)

After graduation….

This major provides not just neuroscience and neurotechnology knowledge but also the ability to work with complex and noisy multi-dimensional data, particularly those from humans!

PhD studies

Companies

- Health / medical technology
- Data science
- Consultancy
- Game industry
- …

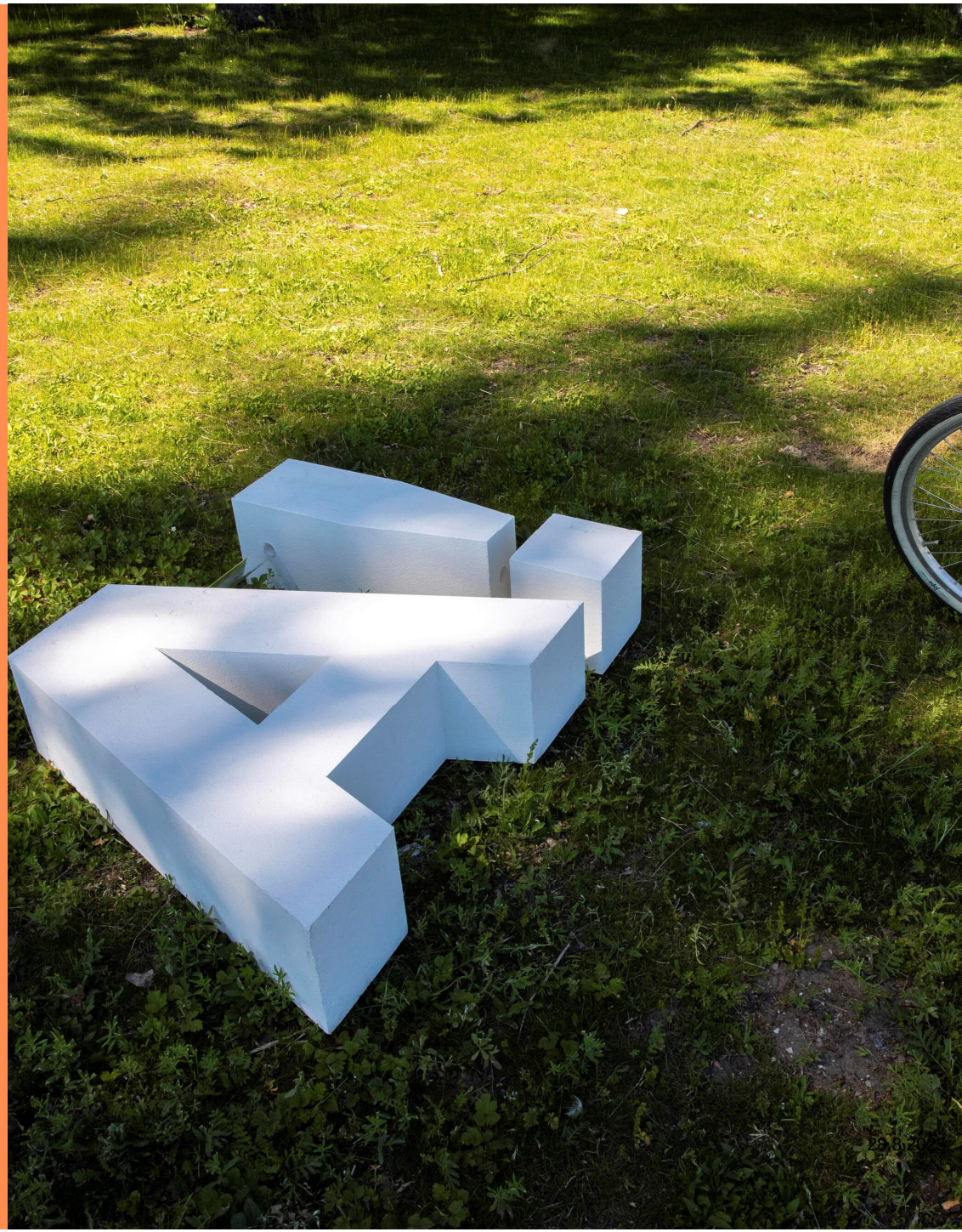
Public sector

- Hospitals (e.g. towards medical physicist)
- Research institutes
- …

rientation for new master udents of Life Science echnologies

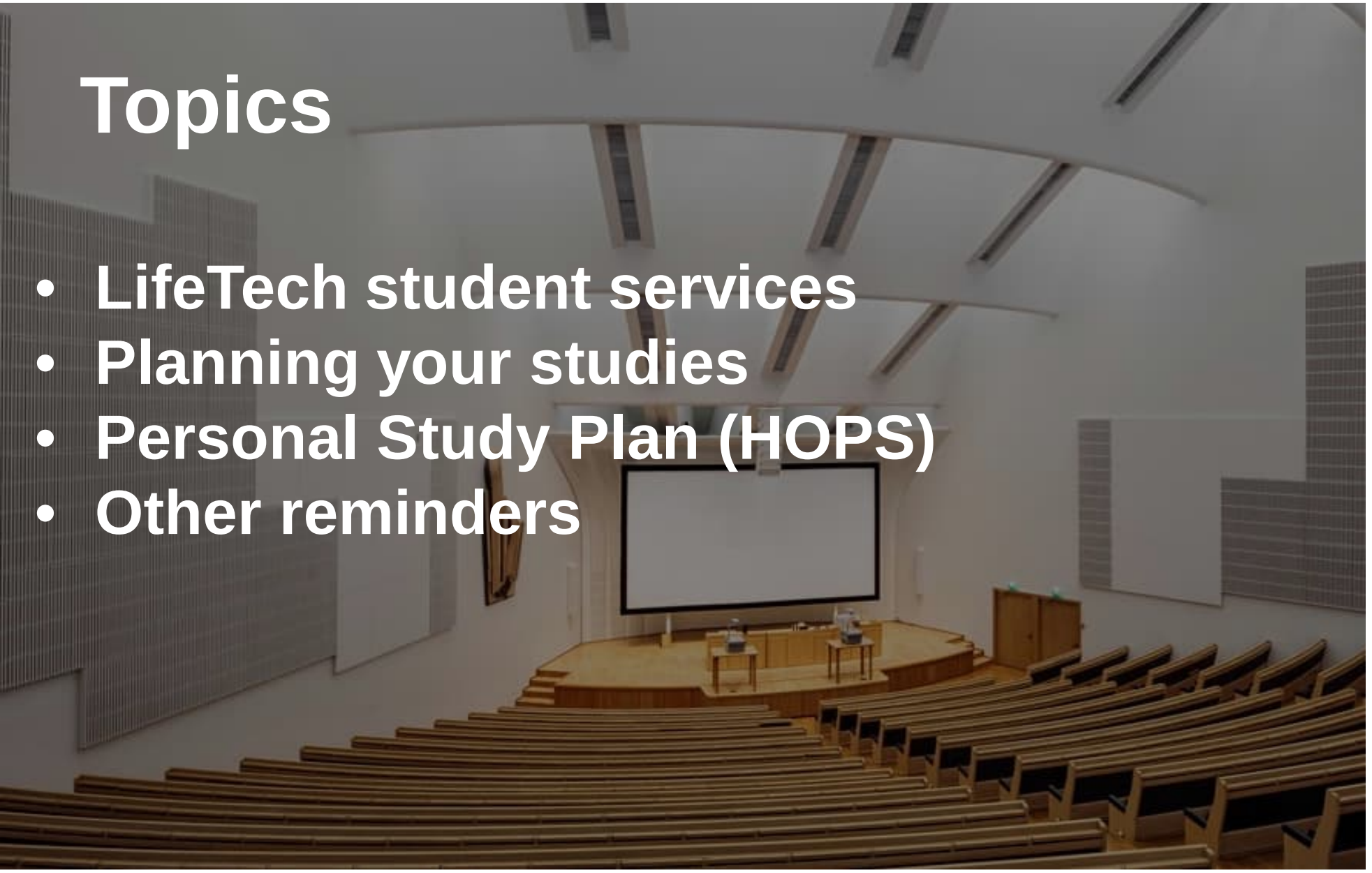
- Opening words and introduction of the programme
- Introduction of majors
- Introduction of student services, information about planning studies and other study related topics
- Majors’ sessions

!



Topics

- LifeTech student services
- Planning your studies
- Personal Study Plan (HOPS)
- Other reminders



Aalto University
School of Science

tudent services of LifeTech programme

28.8.2025

iosystems and Biomaterials Engineering

Anna Mäkilä

- Planning Officer
- Study Plan (HOPS) approval
- Credit transfer
- Exchange learning agreements

!

iosystems and Biomaterials Engineering

Juha Oksa

Study Coordinator

- Master's thesis process
- Graduation process

!

oinformatics and Digital Health, Biomedical Engineering, Biosensing ar
oelectronics, Complex Systems, Human Neuroscience and Technology

Päivi Koivunen

Planning Officer

- Study Plan (HOPS) approval
- Credit transfer
- Exchange learning agreements
- Master's thesis process

!

How to contact Student Services?

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Student Services are located Konemiehentie 2 and Kemistintie 1

Please note that we work in hybrid-mode, so always book an appointment!

Our contact information in the Student guide: https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/contact

Study-related information systems at Aalto

Aalto University
School of Science

Study-related information systems at Aalto

Student guide: https://www.aalto.fi/en/student-guide
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Sisu (Student information system): https://sisu.aalto.fi/
Personal study plan (HOPS), enrolling for courses, completed courses, Transcript of Records and Certificate of Student Status.

MyCourses: https://mycourses.aalto.fi/
Tool for everyday course work and communication. It also contains course descriptions.

MyStudies: https://mystudies.aalto.fi/s/
Book appointment with Aalto staff (e.g., student services, study psychologists)

Degree structure

!

Sc degree (120 credits)

Major (60 or 65 cr)

- **Compulsory courses**
- **Optional courses**

Elective studies (25 or 30 cr, depending on the extent of the major)

Master’s thesis (30 cr)

!

aster of Science (Technology) degree

Degree: 120 ECTS credits exactly or as close as possible

Exceeding courses will not appear on the diploma, but it’s possible to get a transcript for all completed courses

The programme is planned to be taken in two years, but the study right is valid for four years

!

Planning your studies

!

HOPS

- Henkilökohtainen OPintoSuunnitelma = Personal Study Plan
- Your degree = courses in your approved HOPS
- The first HOPS does not need to be the final one
- You can only enrol on courses that are in your primary study plan
- Remember to keep your HOPS up-to-date!

Aalto University
School of Science

Plan your studies

- Follow the curriculum.
- Check also Planning your studies –page.
- Consider the following questions:
  - What do I want from my studies?
  - What skills do I want to develop?
  - What are my career goals?

HOPS process

- Make your preliminary HOPS for the whole degree at beginning your studies.
- **You can change and edit the plan during your studies.**
- While selecting the courses for your degree, you should also schedule your studies, i.e. plan in which study period and during which study year you are taking the course. You can use Sisu's Timeline function. This helps you to balance the workload between autumn/spring terms.
- You can register on the courses even before the HOPS is approved.

Get approval

- Some parts of HOPS require approval, and those parts are followed by "Approval required"
- Elective studies:
  - If you are not yet completely sure about your course choices, you can apply for approval in Sisu later also.
  - Don't apply for approval in Sisu, if you haven't done all the selections for that part.

Students with Aalto scholarship need to have HOPS completed and approved by 30 October is a required DL

otifications in Sisu

!

anning your studies

Code	Course name	ECTS credits	Period/Year
JOIN-E3100	Life Science Technologies Project Course A	2	I/1
JOIN-E3200	Life Science Technologies Project Course B	8	III-V/1
Choose courses from themes 1 and 2 as is instructed.			
Theme 1: Bioinformatics and digital health Choose minimum of 15 ECTS.			
CS-C4100	Digital Health and Human Behavior	5	II/1
CS-E5875	High-throughput Bioinformatics	5	III/1
CS-E5885	Modeling Biological Networks	5	II/1
CS-E4885	Machine Learning in Biomedicine	5	I-II/2
CHEM-E8120	Cell Biology	5	I/1

anning your studies

Planning your studies (Student Guide): https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/planning-your-studies

Curriculum (Student Guide): Curriculum 2024-2026 | Aalto University

Create your HOPS in Sisu: https://www.aalto.fi/en/applications-instructions-and-guidelines/sisu-instructions-front-page

Sisu (Student Information System): https://sisu.aalto.fi/

!

Compulsory language studies

Compulsory language studies

Sc degree from Finland

- language studies completed in the BSc degree → no language studies required in MSc degree

!

Compulsory language studies

Sc degree abroad

- comprehensive and upper secondary education abroad → 3 credits of foreign language studies
- comprehensive and/or upper secondary education in Finland → studies in the language of education, second national language and foreign language may be required

!

Compulsory language studies

formation about the language requirement will be sent by mail in September

anguage studies are included in the elective studies.

!

Compulsory language studies

oreign language

- Not Finnish or Swedish
- 3 credits
- English recommended, but other languages accepted
- Intermediate or advanced level
- Both oral and written part
- Courses with letters O and W after the name of the course meet the criteria

!

Compulsory language studies

- Excellent command of English → 3 credits of Finnish or 3 credits of Swedish instead
- Basic courses accepted

!

Elective studies

!

ective Studies

s elective studies, you can

- select additional courses from the major
- select individual courses from other programmes at Aalto University
- select a minor
- select individual courses form other Finnish Universities
- participate in an international student exchange programme https://www.aalto.fi/en/other-studies/exchange-studies
- include 1-10 ECTS of work experience completed in Finland or abroad.

- Note! Only work experience gained after 1.8.2025 can be accepted.

!

ective Studies

You can complete studies also outside your own field of study

All courses are not open to all Aalto students!

- Mainly applies to Aalto ARTS courses

As a student, you are responsible for checking whether there are any prerequisites for taking a course or a minor

In practice, a maximum limit on the number of participants may limit course access.

Information on limits to course size and on the order of priority is available on the course information sheet.

!

Elective Studies

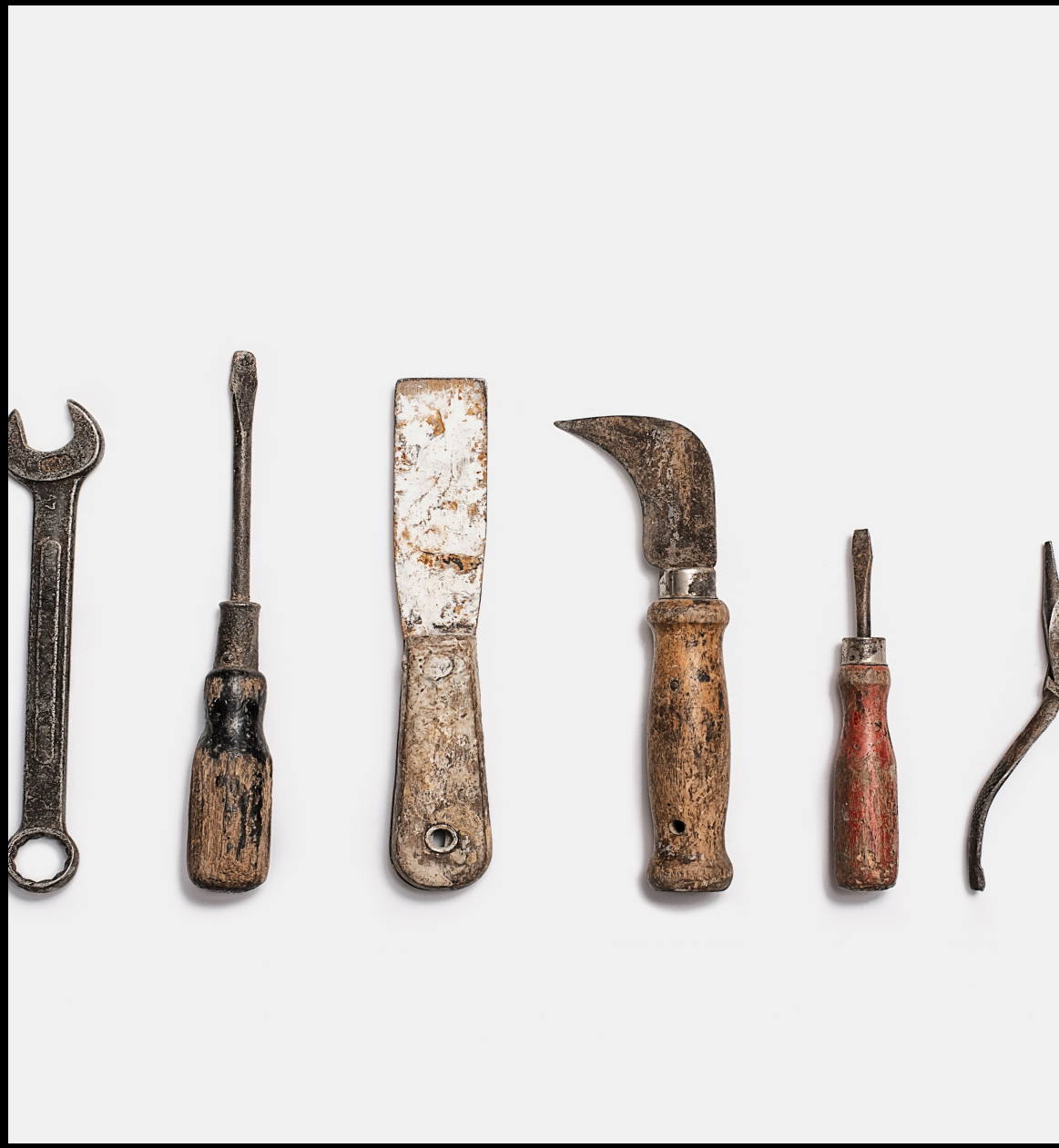
- Elective studies must be university level studies that fulfill the degree requirements and in general, studies that are offered as degree studies at the university in question.
- Universities also offer courses that are targeted for a larger audience. The suitability of these studies is evaluated taking into consideration the learning outcomes of the degree that the courses are planned to be included in.

→ *If you plan to complete Massive Open Online Courses (MOOCs), please contact Anna (BioSM) or Päivi (other majors) beforehand.*

you need help…

With HOPS or degree structure in general, contact your planning officer

- https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/contact
- Send an email or book an appointment in MyStudies, do not send a message in Sisu



!

Other reminders

Follow your Aalto e-mail!

Read the student newsletter

Contact other Aalto services if needed, for example Starting Point of Wellbeing

- https://www.aalto.fi/en/support-for-studying/contact-information-for-learning-services

Questions?

!

EXT: Major specific sessions

- Bioinformatics and Digital Health (Harri Lähdesmäki)
  - Major’s session will be organized later.
- Biosensing and Bioelectronics (Tomi Laurila)
  - Major’s session on Fri 29.8. at 12.00 at Micronova, Tietotie 3
- Biosystems and Biomaterials Engineering (Heli Viskari)
  - Major’s session on Wed 27.8. at 10.00 in Ke3, Kemistintie 1
- Complex Systems (Mikko Kivelä)
- Biomedical Engineering (Matias Palva) & Human Neuroscience and Technology (Lauri Parkkonen)

!

Kiitos
aalto.fi

Orientation for new master students of Life Science Technologies

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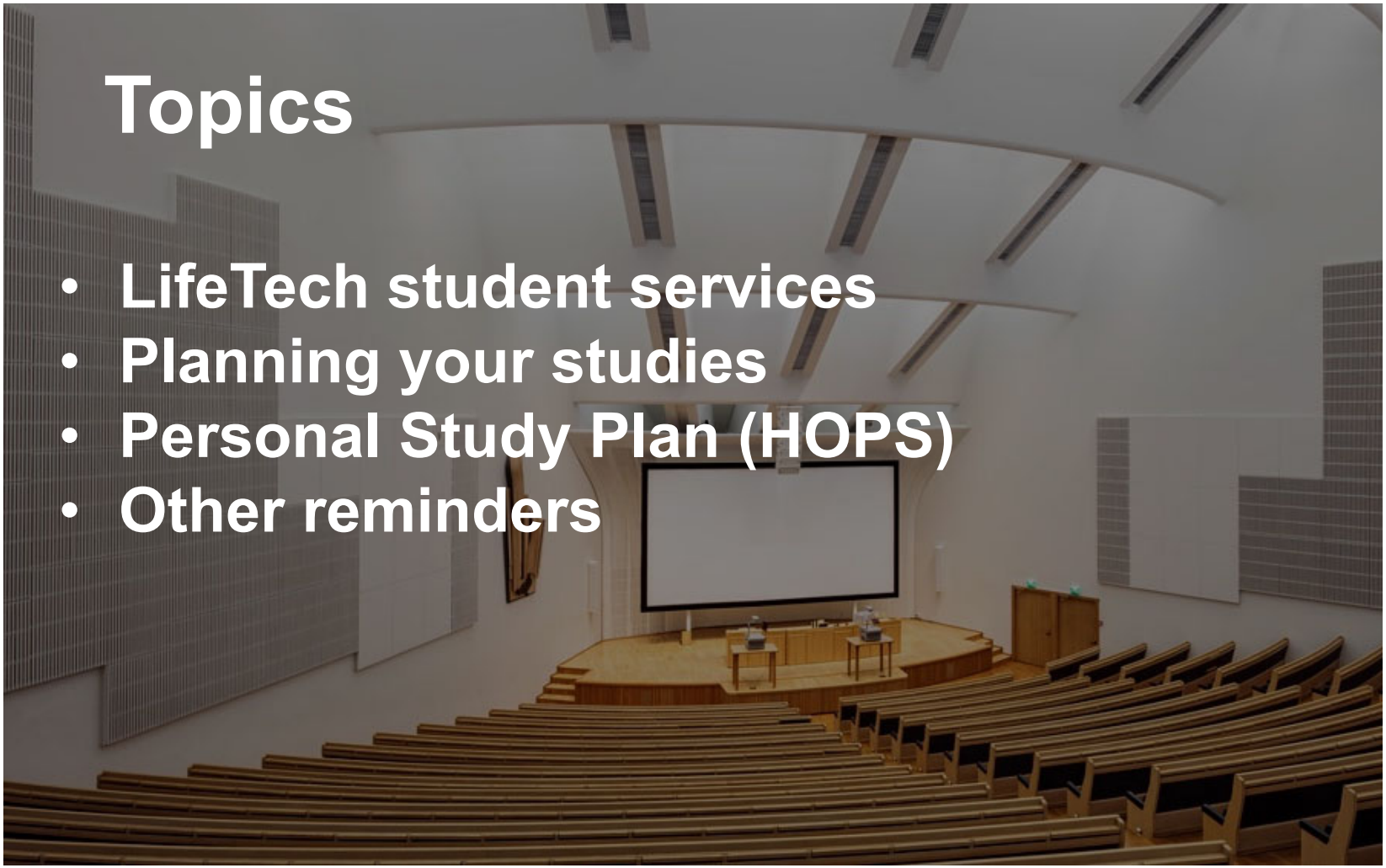
A!



Topics

- LifeTech student services
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Aalto University
School of Science

Student services of LifeTech programme

Biosystems and Biomaterials Engineering

Anna Mäkilä

Planning Officer

- Study Plan (HOPS) approval
- Credit transfer
- Exchange learning agreements

A!

Biosystems and Biomaterials Engineering

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Study Coordinator

- Master's thesis process
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Aalto University
School of Science

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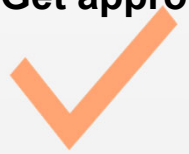
- **You can change and edit the plan during your studies.**
- While selecting the courses for your degree, you should also schedule your studies, i.e. plan in which study period and during which study year you are taking the course. You can use Sisu's Timeline function. This helps you to balance the workload between autumn/spring terms.
- You can register on the courses even before the HOPS is approved.

Get approval



- Some parts of HOPS require approval, and those parts are followed by "Approval required"
- Elective studies:
  - If you are not yet completely sure about your course choices, you can apply for approval in Sisu later also.
  - Don't apply for approval in Sisu, if you haven't done all the selections for that part.

Students with Aalto scholarship need to have HOPS completed and approved by 30 October is a required DL

A!

Notifications in Sisu

Planning your studies

Code	Course name	ECTS credits	Period/Year
JOIN-E3100	Life Science Technologies Project Course A	2	I/1
JOIN-E3200	Life Science Technologies Project Course B	8	III-V/1
Choose courses from themes 1 and 2 as is instructed.			
Theme 1: Bioinformatics and digital health Choose minimum of 15 ECTS.			
CS-C4100	Digital Health and Human Behavior	5	II/1
CS-E5875	High-throughput Bioinformatics	5	III/1
CS-E5885	Modeling Biological Networks	5	II/1
CS-E4885	Machine Learning in Biomedicine	5	I-II/2
CHEM-E8120	Cell Biology	5	I/1

A!

Planning your studies

- Planning your studies (Student Guide): https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/planning-your-studies
- Curriculum (Student Guide): Curriculum 2024-2026 | Aalto University
- Create your HOPS in Sisu: https://www.aalto.fi/en/applications-instructions-and-guidelines/sisu-instructions-front-page
- Sisu (Student Information System): https://sisu.aalto.fi/

Compulsory language studies

Compulsory language studies

BSc degree from Finland

- language studies completed in the BSc degree → no language studies required in MSc degree

Compulsory language studies

BSc degree abroad

1. comprehensive and upper secondary education abroad → 3 credits of foreign language studies
2. comprehensive and/or upper secondary education in Finland → studies in the language of education, second national language and foreign language may be required

Compulsory language studies

Information about the language requirement will be sent by email in September

Language studies are included in the elective studies.

Compulsory language studies

Foreign language

- Not Finnish or Swedish
- 3 credits
- English recommended, but other languages accepted
- Intermediate or advanced level
- Both oral and written part
- Courses with letters O and W after the name of the course meet the criteria

Compulsory language studies

- Excellent command of English → 3 credits of Finnish or 3 credits of Swedish instead
- Basic courses accepted

Elective studies

Elective Studies

As elective studies, you can

- select additional courses from the major
- select individual courses from other programmes at Aalto University
- select a minor
- select individual courses form other Finnish Universities
- participate in an international student exchange programme https://www.aalto.fi/en/other-studies/exchange-studies
- include 1-10 ECTS of work experience completed in Finland or abroad.
  - Note! Only work experience gained after 1.8.2025 can be accepted.

Elective Studies

- You can complete studies also outside your own field of study
- All courses are not open to all Aalto students!
    - Mainly applies to Aalto ARTS courses
- As a student, you are responsible for checking whether there are any prerequisites for taking a course or a minor
- In practice, a maximum limit on the number of participants may limit course access.
- Information on limits to course size and on the order of priority is available on the course information sheet.

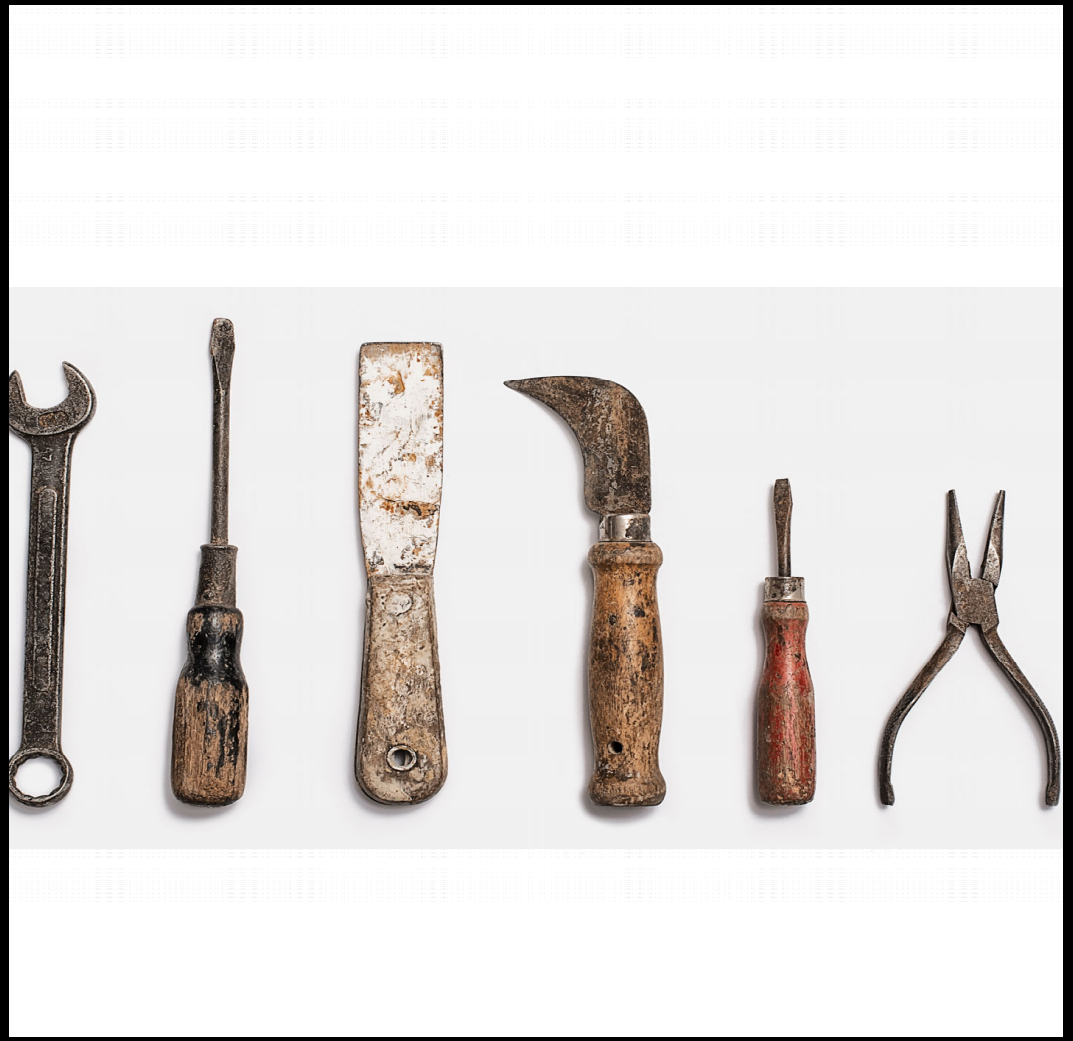
Elective Studies

- Elective studies must be university level studies that fulfill the degree requirements and in general, studies that are offered as degree studies at the university in question.
- Universities also offer courses that are targeted for a larger audience. The suitability of these studies is evaluated taking into consideration the learning outcomes of the degree that the courses are planned to be included in.

→ *If you plan to complete Massive Open Online Courses (MOOCs), please contact Anna (BioSM) or Päivi (other majors) beforehand.*

If you need help…

- With HOPS or degree structure in general, contact your planning officer
  - https://www.aalto.fi/en/programmes/masters-programme-in-life-science-technologies/contact
  - Send an email or book an appointment in MyStudies, do not send a message in Sisu



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Other reminders

- **Follow your Aalto e-mail!**
- **Read the student newsletter**
- **Contact other Aalto services if needed, for example Starting Point of Wellbeing**
  - https://www.aalto.fi/en/support-for-studying/contact-information-for-learning-services

Questions?

A!

NEXT: Major specific sessions

- Bioinformatics and Digital Health (Harri Lähdesmäki)
  - Major's session will be organized later.
- Biosensing and Bioelectronics (Tomi Laurila)
  - Major's session on Fri 29.8. at 12.00 at Micronova, Tietotie 3
- Biosystems and Biomaterials Engineering (Heli Viskari)
  - Major's session on Wed 27.8. at 10.00 in Ke3, Kemistintie 1
- Complex Systems (Mikko Kivelä)
- Biomedical Engineering (Matias Palva) & Human Neuroscience and Technology (Lauri Parkkonen)

Kiitos
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