



Aalto University  
School of Chemical  
Engineering

# Welcome to study at Aalto University!

*Master's Programme in Chemical, Biochemical and Materials Engineering*

*Chemical and Process Engineering*

*30.8.2022 Marjatta Louhi-Kultanen and Anja Hänninen*

# Agenda

1. **Who are we? Getting to know each other**
2. **Personnel of the major**
3. **Degree and major structure**
4. **Special arrangements in Autumn 2022**
5. **Student guidance and coaching**
6. **Practical study matters**

# Who are we?

## A short presentation of everyone present

Please tell briefly something about yourself to others:

- Your name
- The country you are from



# Personnel of the major

## Professors:

- Louhi-Kultanen Marjatta (*professor in charge of major*)
- Alopaeus Ville
- Corona Francesco
- Li Yongdan Oinas Pekka
- Puurunen Riikka
- Seppälä Jukka
- Harjunkoski Iiro

## Lecturers:

- Karinen Reetta
- Pokki Juha-Pekka
- Jakobsson Kaj
- Kortela Jukka
- Lipponen Sami
- Sarwar Golam
- Viinikainen Tiia

# Personnel of the major - professors



**Marjatta  
Louhi-Kultanen**  
Chem. Eng. in  
Aqueous Syst.  
*(in charge of major)*



**Ville Alopaeus**  
Chemical  
Engineering



**Francesco Corona**  
Process Control



**Iiro Harjunkoski**  
Process Control



**Yongdan Li**  
Industrial Chemistry



**Pekka Oinas**  
Plant Design



**Riikka Puurunen**  
Catalysis



**Jukka Seppälä**  
Polymer Technology

# Learning services



Photo: Unto Rautio

**Student advisor:** N.N.  
[msc-advisors-chem@aalto.fi](mailto:msc-advisors-chem@aalto.fi)

**Study secretary:** Kati Sumu  
[studies-chem@aalto.fi](mailto:studies-chem@aalto.fi)

**Planning officer:** Anja Hänninen  
[anja.hanninen@aalto.fi](mailto:anja.hanninen@aalto.fi)

**Additional information:**  
<https://into.aalto.fi/display/encbme/Contact>

# Degree structure and planning your studies

# Degree structure

## 120 ECTS credits:

- **Academic Learning Community (3-5 cr)**
  - *common to all students in Master's Programme in Chemical, Biochemical and Materials Engineering regardless of the major*
- **60 cr major studies**
  - *Compulsory studies*
  - *Specialization studies*
- **30 cr master's thesis** (approx. 5 months active work)
- **25 - 27 cr elective studies**
  - *Can include a minor*

→ Master of Science (Tech.)

Academic Learning Community (3 - 5)

Major studies (60 cr)

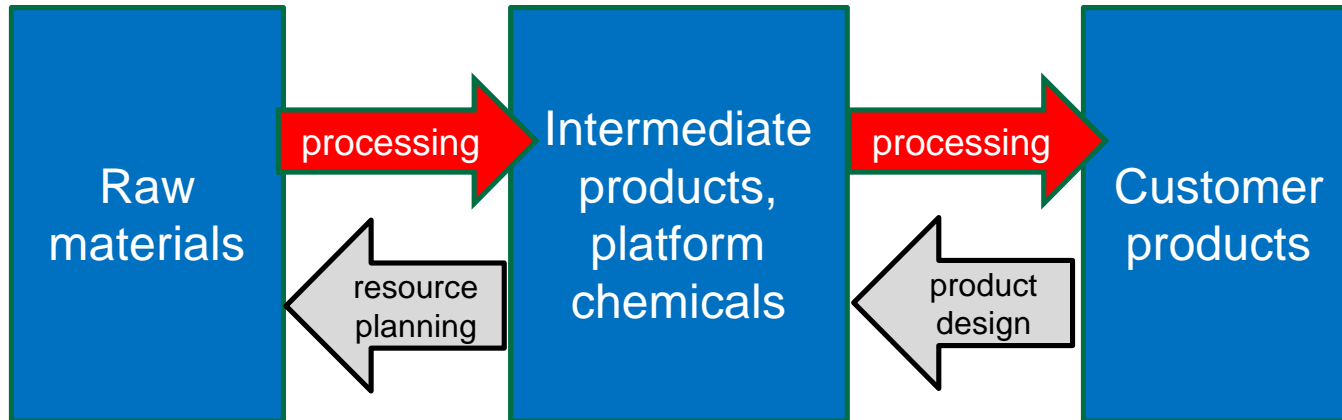
Master's thesis (30 cr)

Electives (25 - 27 cr)





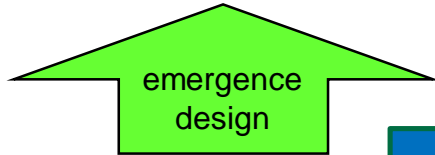
# From raw materials to products (value chain perspective)



# From phenomena to processes (multiscale perspective)

- Plant level
- Impact
- Large scale

Chemical industrial plants, production planning,  
economics, societal effects, environment



- Process level
- Engineering
- Equipment scale

Separation  
processes

Conversion  
processes

Other processing  
units (pumps, vessels...),  
instrumentation



- Phenomena level
- Natural sciences
- Molecular scale

Transport  
phenomena

Chemical  
kinetics,  
catalysis

Thermodynamics,  
physical  
properties

# Major structure

Common compulsory course 3-5 cr

Compulsory courses 35 cr

Specialization courses 25 cr

Elective studies 25-27 cr

Thesis 30 cr

## 1st year

Fall I

Spring I

Academic Learning Community (3-5 cr)

Engineering Thermodynamics, Separation Processes, part I

Laboratory Project in Chemical Engineering

Process Dynamics and Control

Design Project in Chemical Engineering, part A

Reaction Engineering

Process Modeling

Specialization course

Specialization courses

Elective studies

## 2nd year

Fall II

Spring II

Design Project in Chemical Engineering, part B

Specialization course

Elective studies

Thesis

# Specialisation studies (25 cr)

## *Chemical Engineering*

**Engineering Thermodynamics, Separation Processes, part II**  
II / 1st

**Experimental Assignment in Chemical Engineering**  
I-II or III-V / 1<sup>st</sup> or 2nd

**Fluid Flow in Process Units**  
IV-V / 1st

## *Reaction Engineering*

**Experimental Assignment in Chemical Engineering**  
I-II or III-V / 1<sup>st</sup> or 2nd

**Reactor Design**  
III-IV / 1st or 2nd

**Catalysis**  
III / 1st or 2nd

## *Polymer Engineering*

**Experimental Assignment in Chemical Engineering**  
I-II or III-V / 1<sup>st</sup> or 2nd

**Polymer Properties**  
II / 1st

**Polymer Reaction Engineering**  
III-V / 1st

## *Plant Design*

**Process Development**  
I-II / 1<sup>st</sup> or 2nd

**Process Safety and Sustainability**  
I-II / 1<sup>st</sup> or 2nd

**Plant/Process Design and Business Management**  
III-V / 1st or 2nd

## *Process Systems Engineering*

**Production Planning and Optimization**  
I / 1st

**Advanced Process Control**  
III / 1st or 2nd

**Special Course in Process Systems Engineering**  
IV / 1st or 2nd

# Specialization track Chemical engineering

## Equipment design of unit operations

- Solid-liquid, liquid-liquid, gas-liquid, multi-phase, kinetics

## Process simulation software Aspen Plus

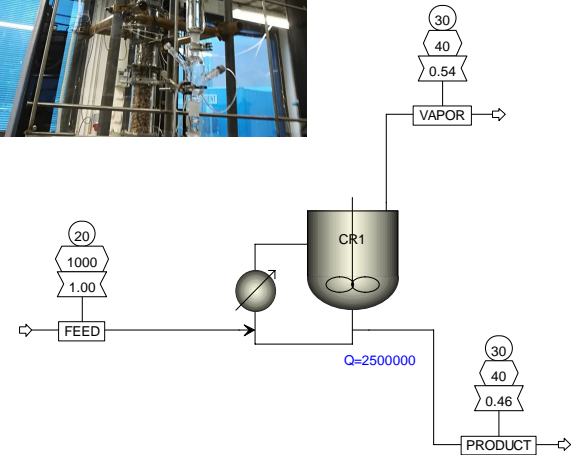
- Studies with laboratory and pilot scale equipment

## Thermodynamics

- Equilibria of multi-phase systems
- Ideal and non-ideal compound systems

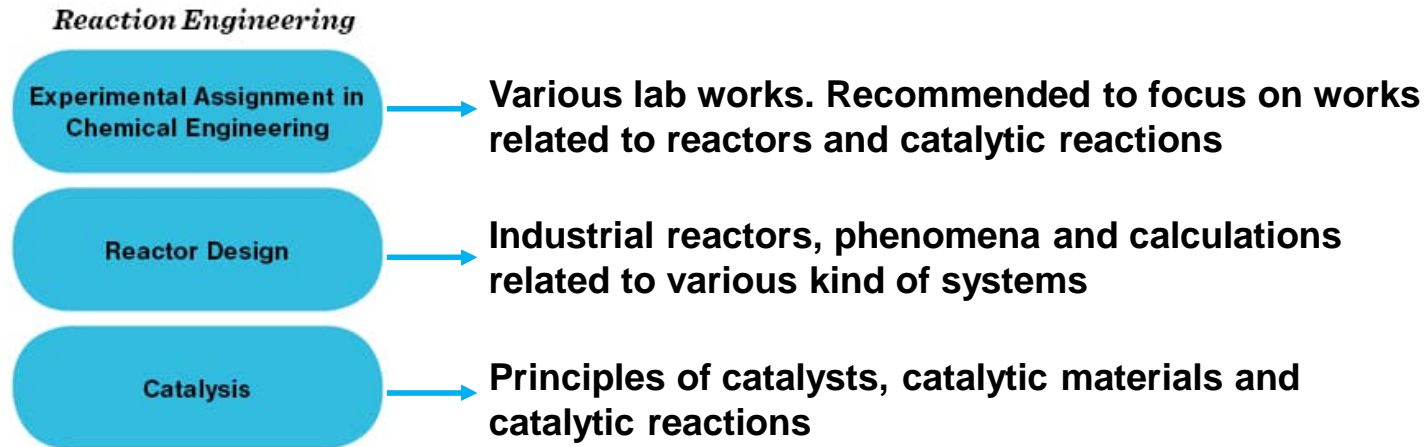
## Fluid flows

- Computational Fluid Dynamics modeling by Comsol software



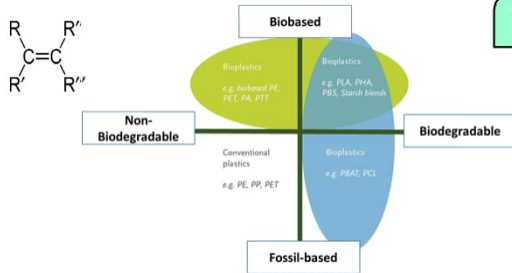
# Specialization track Reaction engineering

The Reaction engineering track focuses on **chemical reactors** and **catalytic reactions**.

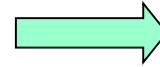
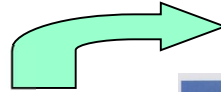


# Specialization track Polymer Engineering

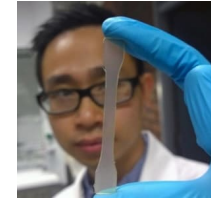
## Monomers



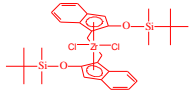
## Polymer Engineering



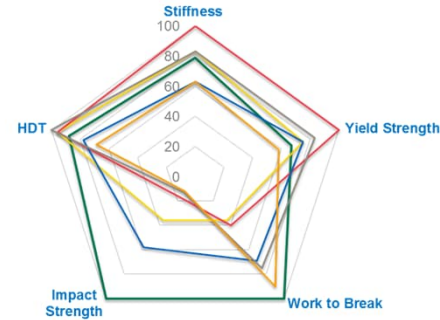
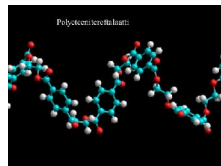
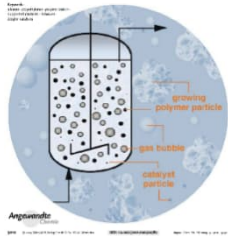
## Products



## Catalysts

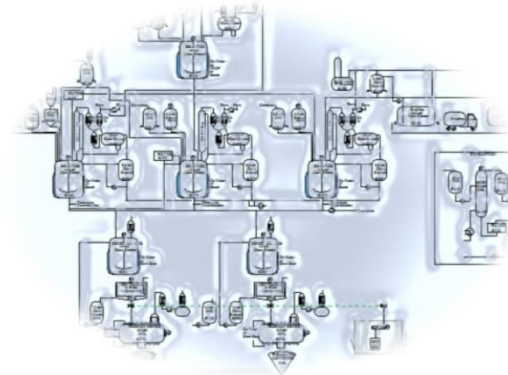
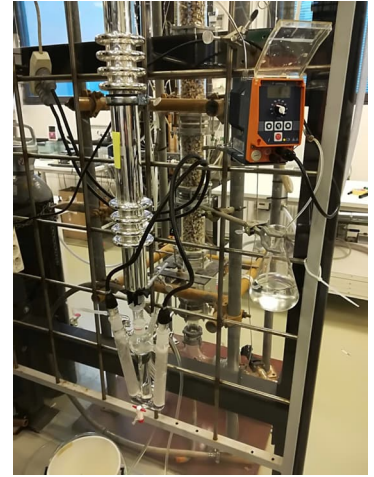


## Polymerization and reactors



# Specialization track Plant Design

- Innovative design of chemical plants
- Basic principles of large scale, real-life industrial equipment and operations
- Scale-up
- Dimensioning of equipment
- Process design chain from R&D to plant start-up
- Techno-economic-societal assessment
- Process simulation and cost calculation
- Safety & sustainability and EHSQ-issues
- Business, competition and markets
- 'Out-of-the- box' –mindset for design of industrial operations





# Specialization track Process Systems Engineering

Learning and research at the interface of **Automatic Control, Applied Maths and Machine Learning**

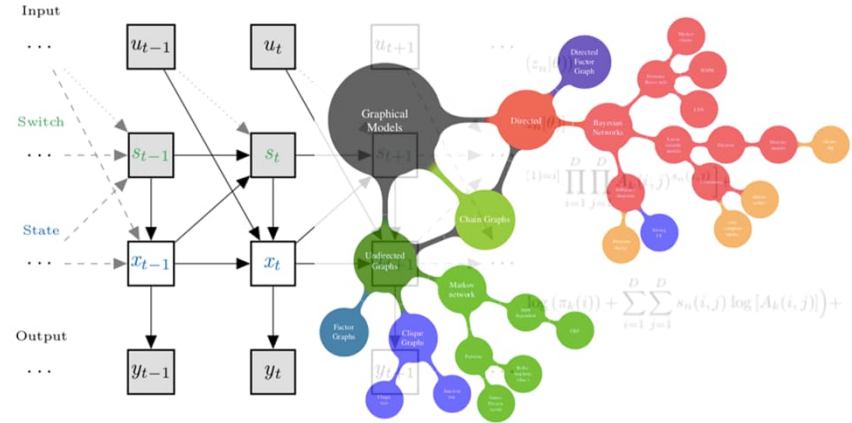
- Focus on full-scale (bio-) chemical and environmental process systems

Combine **phenomenological and statistical modelling**, with a touch of **data science**

- Dynamics and control of process systems
- Large-scale optimization and planning and scheduling of production processes

**A computational approach to a sustainable and resource-efficient process engineering**

**World-class infrastructure (Factory of future automation, in the ABio Center)**



**Unique professional profile for process engineers**

- They want you out there

**Scientific career with opportunities for innovation**

- We need you in here

# Elective studies / Minor

- Elective studies (25-27 cr)
- Students specialising in process systems engineering are encouraged to select one or more of these courses:
  - *MS-E2122 Nonlinear Optimization, 5 cr, I-II*
  - *CS-EJ3211 Machine Learning with Python, 2 cr, I-II*
  - *ENG-A1003 Numerical Methods in Engineering, 5 cr, III*
  - *MS-C2105 Introduction to Optimization, 5 cr, IV*
  - *MS-A0503 First course in probability and statistics, 5 cr, III OR MS-A0504 Todennäköisyyslaskennan ja tilastotieteen peruskurssi, 5 cr, IV*
  - *CS-E4710 Machine Learning: Supervised Methods, 5 cr, I-II*

# Elective studies / Minor

- Possible to include a minor (15-25 cr) into the elective studies
- Minor not compulsory → degree without minor
- Recommended minors:
  - *Biomass Refining*
  - *Chemistry*
  - *Sustainable Metals Processing*
- <https://into.aalto.fi/display/enopinnot/Minors+2020-2022>

# Practical study matters

CHEM-E0140  
Laboratory  
Safety  
Course

There are two courses,  
you need to pass only one of them:

**CHEM-A1010 Turvallinen työskentely  
laboratoriossa**

*(Finnish version for bachelor students)*

OR

**CHEM-E0140 Laboratory Safety Course**

*(English version, mainly for master level  
and exchange students)*

**Access to CHEM buildings  
is automatically linked to  
Lab Safety Courses**

# What to do?

1. Add "**CHEM-E0140 Laboratory Safety Course**" to your personal study plan (HOPS) in SISU ([sisu.aalto.fi](http://sisu.aalto.fi))
2. Register to the course "**CHEM-E0140 Laboratory Safety Course**" in SISU ([sisu.aalto.fi](http://sisu.aalto.fi))
3. Go to MyCourses page of "**CHEM-E0140 Laboratory Safety Course**" ([mycourses.aalto.fi](http://mycourses.aalto.fi))
4. Follow the link to Virtual Lab Space
5. Take the Digital Exam in the MyCourses
  - You will be notified immediately whether you passed the exam (to pass: 65 % of the points).
  - You can take the exam as many times as you like.
  - It is recommended that you have Virtual Lab open at the same time as you take the exam.

**Try not to just guess but find answers from Virtual Lab**  
→ This is for your own safety

# Make the course **this week**

– you need a Lab Pass to enter the labs

- **After** passing Lab Safety Course, you will be printed a Lab Pass



- You have to have Lab Pass visible on your lab coat when entering labs

- Pick up your Lab Pass from Study Advisors' pop-up desk (CHEM main lobby, Kemistintie 1) during its opening times

Study period when you take the Lab Safety	Passes ready in Study Advisors pop-up desk
Orientation Week September 2022 (no later than Sun 4 <sup>th</sup> Sep)	WED 7 <sup>th</sup> September onwards
PERIOD I (no later than Sun 11 <sup>th</sup> Sep)	WED 13 <sup>th</sup> September onwards
PERIOD II (no later than 30 <sup>th</sup> Oct)	WED 2 <sup>nd</sup> November onwards
Orientation Week January 2022 (no later than Sun 8 <sup>th</sup> Jan)	WED 11 <sup>th</sup> January onwards
PERIOD III (no later than 15 <sup>th</sup> Jan)	WED 18 <sup>th</sup> January onwards
PERIOD IV (no later than 5 <sup>th</sup> March)	WED 8 <sup>th</sup> March onwards
PERIOD V (no later than 30 <sup>th</sup> April)	THU 4 <sup>th</sup> April onwards

# Language studies

- Mandatory in your degree if not part of your bachelor's degree (according to degree regulations)
- **3 ECTS** credits
- Only courses with letters O (for oral) and W (for written) fulfil the requirements
- English recommended, but other languages can be taken as well
- Finnish basic courses allowed
- Students with a Finnish bachelor's degree (including AMK students): usually no obligatory language studies required





# Master's Thesis

**Goal: master's thesis completed by the end of the 2<sup>nd</sup> study year**

Before you start your master's thesis:

- complete all compulsory studies
- complete at least 40-45 credits of major
- make sure your study plan is up-to-date

How to find a thesis position/topic:

- Be active!
- Start looking for a master's thesis position early, during the Spring of the 1<sup>st</sup> study year
- Be open to new ideas!
- Don't wait too long for the "perfect" master's thesis offer

WHAT PEOPLE THINK  
THESIS WRITING IS  
LIKE:



WHAT I THINK THESIS  
WRITING IS LIKE:



WHAT THESIS WRITING  
IS REALLY LIKE:



# Planning your studies

All students are required to prepare a **personal study plan (HOPS)** as a part of their master's studies and always keep it up-to-date.

- The study plan is a **binding agreement** on both parties: the student and the university.
- Students can, at any time of their studies, **update** their study plan. The study plan should at all times correspond to the student's current plan for his/her studies. Changes to the study plan should always be done before participating in courses.

# Planning your studies

- The study plan includes:
  1. Major courses, based on curriculum
    - *Compulsory courses and specialisation courses*
  2. Elective courses
    - *Possible to include a minor in the elective studies, not compulsory*
  3. Timing of all chosen courses and the master's thesis
- Study plans are created in SISU
- Some parts require approval
  - *Approved by the planning officer, deviations from the curriculum need to be separately approved by the professor in charge of the major*
- More instructions: <https://into.aalto.fi/display/encbme/Planning+your+studies>

# Why should you earn your degree within two academic years?

Requires an average of 60 credits per year

## WHY?

- It shows your potential future employers that you are able to commit to your studies and that you can acquire a wide spectrum of new knowledge while keeping to an agreed schedule
- CHEM rewards students who have completed their degree within the target time -> 500€

More information: <https://into.aalto.fi/display/encbme/Planning+your+studies>



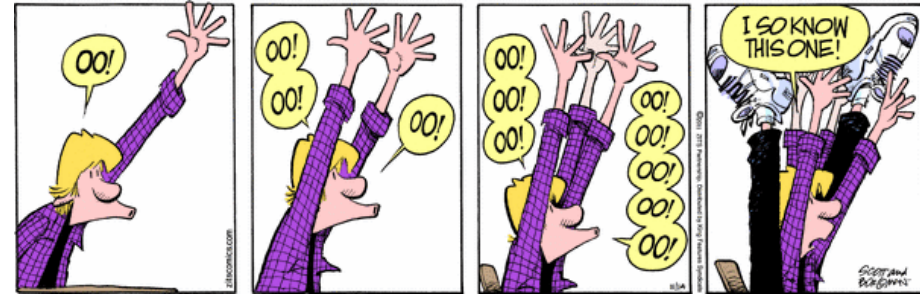
# Feedback

- Be active in providing your feedback regarding courses and also the major as a whole.
- Course feedback is collected after every course and is valuable for course development.
- Feedback sessions with students and teachers will be organized. These sessions are a part of the CHEM-E0105 Academic Learning Community course.
- Answer the AllWell? questionnaire.

# Be an active student

- Take the responsibility of your studies
- Use the curriculum and other resources → Into, MyCourses, SISU

- Read your **aalto.fi e-mails**
  - *Change the password when required*



- Can't find information or unsure -> please, ask!
- Participate actively in your courses and challenge your teacher!

# Major page on MyCourses

Chemical and Process Engineering has its own forum for common issues of the major

**<https://mycourses.aalto.fi/course/view.php?id=19603>**

- Gallery introducing teaching staff
- Teachers' feedback on students' course feedback
- Recommended literature
- New topics for Master's theses, new positions, etc.

# What's next?

- IT services at Aalto & course registrations **Thu 1 Sept. 9:30-11:00** *Lecture hall KE2, Kemistintie 1*
    - *Recommended to everyone!*
  - Aalto Welcome Fair **Thu 1 Sept. 10-16** *Väre/Korkeakoulunaukio*
    - 13:30 Lecture: "Better student life at Aalto" *available at lecture hall KE 1, Kemistintie 1*
  - Pop-up Q&A Session with Learning Services **Fri 2 Sept.10:00-11:30** *Lecture hall KE2, Kemistintie 1*
    - *Come and meet us, if you have any questions*
  - Student culture - TeekkariLIFE lecture **Fri 2 Sept. 12:00-14:00** *Lecture hall Aalto, Otakaari 1*
-



# Student guidance and coaching in Aalto CHEM

# Academic advising

The academic advising at Aalto CHEM is organised in connection with the course CHEM-E0105 Academic Learning Community.

- *Two compulsory individual meetings with your academic advisor (academic advisor organizes)*

**Aalto guidance and support for students:**  
<https://www.aalto.fi/en/services/guidance-and-support-for-students>



# Academic advising

Most students felt that they benefit from the meetings (85,7%)

Many students wish for more than 2 meetings

## Benefits for a student

- *help & advice & tips*
- *having a mentor, someone confidential supporting you*
- *getting feedback and ideas, other opinions*
- *a good possibility to talk, to share feelings*
- *building an academic network*

*We could discuss anything related to studies and courses*

*I was able to reflect on my studies and see what went well and what I still need to improve upon.*

*I think it is just the fact that my advisor listened to everything and she didn't make it difficult to talk to her.*

*Very good concept! Good to have a person assigned to you so you know who to ask when you need help with something.*

*The advisor answered to every question and we had altogether quite a nice meeting.*

***All in all, I feel like academic advising is needed and welcome!***

# Meeting the academic advisors

- Get to know each other
- Study plan
- Free discussion

# Academic advising groups

## 1. Francesco Corona

Arman Arbloo Nareh  
Sevda Esmailzadeh  
Dilmaghani  
Rudolf Nikander  
Santeri Haapanen  
Joonas Savelainen

## 2. Kaj Jacobsson

Markus Kieksi  
Karri Kumpulainen  
Samuli Hytönen  
Taru Tuomi  
Tobias Waris

## 3. Yongdan Li

Jiaqi Wang  
Felix Hyppönen  
Veikka Lehtinen  
Sami Wall  
Juho Cederström

## 4. Jukka Kortela

Sara Partanen  
Santeri Pykäläinen  
Tino Luoma  
Matti Jokela  
Jesse Oinonen

## 5. Pekka Oinas

Henrik Rale  
Aleksi Toivanen  
Harri Puolakanaho  
Lauri Hellämäki  
Sonja Engblom

## 6. Marjatta Louhi-Kultanen

Udani Anupama  
Kuruppu Arachichige  
Dona  
Muhammad Ossama  
Anastasiia Tochenaia  
Sani Letchu  
Emil Teppola

## 7. Tiia Viinikainen

Anastasia Tervo  
Kai Karvetti  
Silja Pitkälä  
Md Saleh Khan  
Prabin Gautam

# Welcome to begin your master's studies at Aalto University!

