



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*

*2.9.2020 Marjatta Louhi-Kultanen and Monica Sandberg*

# 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 2020**
5. **Student guidance and coaching**
6. **Practical study matters**
7. **Meeting the academic advisors**

# Who are we?

## A short presentation of everyone present

Please tell briefly something about yourself to others, for example:

- Your name
- The country you are from
- Are you studying on campus or remotely?
- What do you expect from the forthcoming academic year 2020-2021?



# Personnel of the major

## Professors:

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

## Other teaching staff:

- Karinen Reetta (*academic advisor*)
- Pokki Juha-Pekka (*academic advisor*)
- Jakobsson Kaj (*academic advisor*)
- Kortela Jukka (*academic advisor*)
- Lipponen Sami (*academic advisor*)
- Sarwar Golam (*academic advisor*)
- 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

# Personnel of the major – other teaching staff



**Reetta Karinen**  
Industrial  
Chemistry and  
Catalysis



**Sami Lipponen**  
Polymer Technology

**Juha-Pekka Pokki**  
Chemical  
Engineering



**Golam Sarwar**  
Plant Design

**Tiia Viinikainen**

**Jukka Kortela**

# Learning services



Photo: Unto Rautio

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

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

**Planning officer:** Monica Sandberg  
[monica.sandberg@aalto.fi](mailto:monica.sandberg@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)



# 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

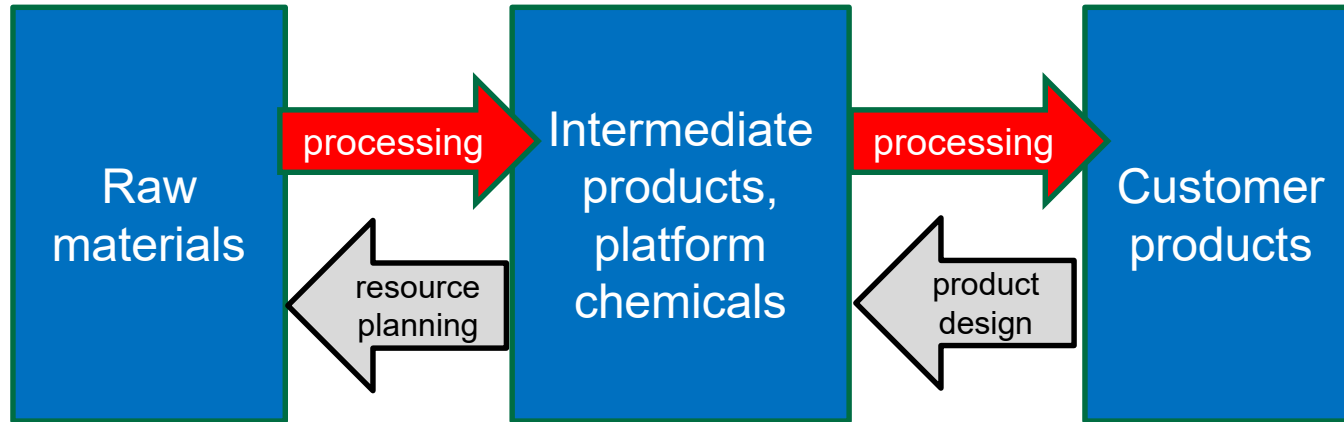
Design Project in  
Chemical Engineering,  
part B

Specialization course

Elective studies

Thesis

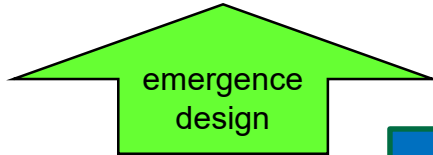
# From raw materials to products (value chain perspective)



# 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

# CHEM-E0105 Academic Learning Community

*Let's make this the best course ever!*

## What?

- Course for *all* master's students in CHEM
- 3-5 cr, depending on completed tasks

## When?

- Periods I-V
- Starting on September 14<sup>th</sup>, 8:30-10 am
- *Please note: MATLAB module (1 ECTS) starts on Monday, Sep 7<sup>th</sup>, 8-10 am*

## Why?

- Learning *general skills and knowledge*
- Helping you *succeed in your studies*

*For more information, check out [MyCourses](#)*



Senior university lecturer  
*Kyösti Ruuttunen* cannot  
wait for the course to start!

Photo: Kitty Norros

# 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

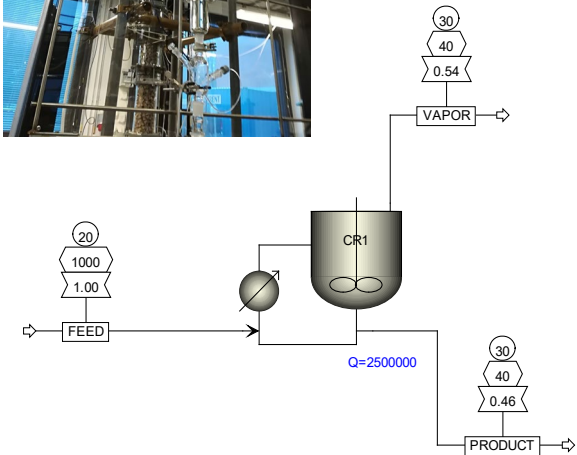
- Studies with laboratory and pilot scale equipment

## Thermodynamics

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

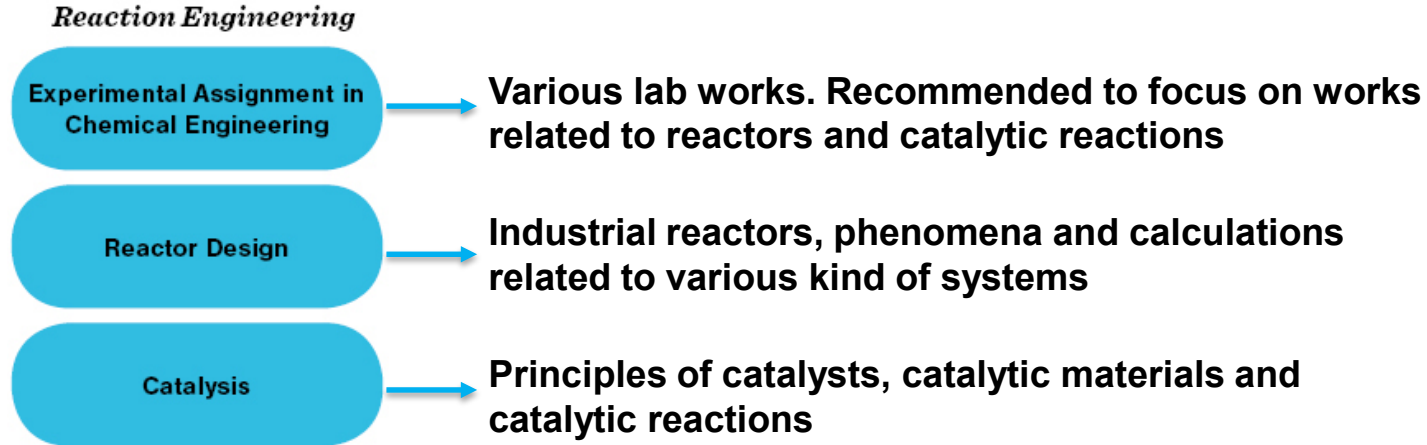
## Fluid flows

- Computational Fluid Dynamics modeling by Comsol software



# Specialization track Reaction engineering

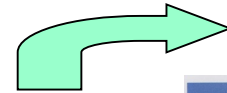
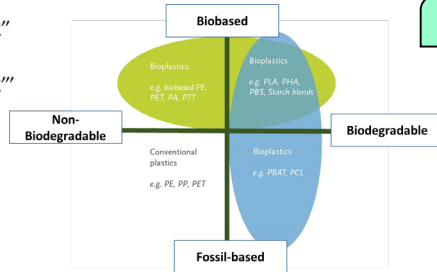
The Reaction engineering track focuses on **chemical reactors** and **catalytic reactions**.



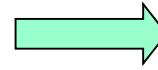


# Specialization track Polymer Engineering

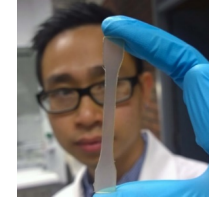
## Monomers



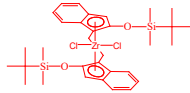
## Polymer Engineering



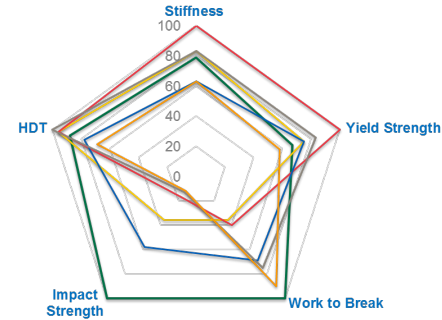
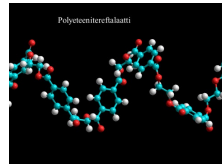
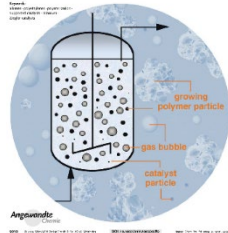
## Products



## Catalysts

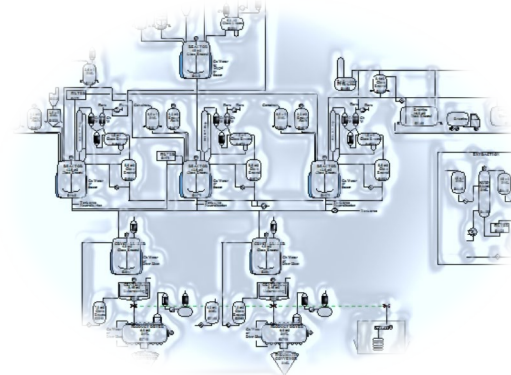


## Polymerization and reactors



# 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**

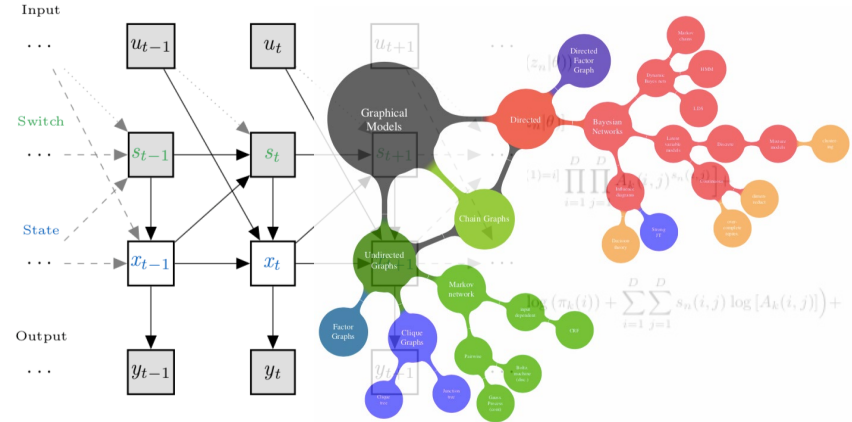
- Focus on full-scale (bio-) chemical and environmental process systems

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

**Which 1-2 track(s) are you preliminarily interested in?**

***Answer the poll.***

***Chemical Engineering  
Reaction Engineering  
Polymer Engineering  
Plant Design  
Process Systems Engineering***

# Special arrangements in Autumn 2020

## *Compulsory courses*

Code	Name	Credits	Period	Arrangements
<u>CHEM-E0105</u>	Academic Learning Community	3-5	I–V	Remote teaching
<u>CHEM-E7100</u>	Engineering Thermodynamics, Separation Processes, part I D	5	I	Remote teaching
<u>CHEM-E7130</u>	Process Modeling	5	I	Remote teaching
<u>CHEM-E7190</u>	Process Dynamics and Control D	5	II	Remote teaching
<u>CHEM-E7150</u>	Reaction Engineering	5	II	Remote teaching

# Special arrangements in Autumn 2020

## *Specialisation courses*

Code	Name	Credits	Period	Arrangements
<u>CHEM-E7110</u>	Engineering Thermodynamics, Separation Processes, part II D	5	II / 1st	Remote teaching
<u>CHEM-E7115</u>	Experimental Assignments in Chemical Engineering	5	I–II or III–V / 1st or 2nd	Labs <b>on campus</b>
<u>CHEM-E2130</u>	Polymer Properties	5	II / 1st	Remote teaching
<u>CHEM-E7105</u>	Process Development	5	I–II / 1st or 2nd	Remote teaching
<u>CHEM-E7175</u>	Process Safety and Sustainability D	5	I–II / 1st or 2nd	Remote teaching
<u>CHEM-E7151</u>	Production Planning and Optimization	5	I / 1st	Remote teaching

# 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>



# CHEM-E0140 Laboratory Safety Course

- Instructions to Digital Lab Safety Course, [kirsi.yliniemi@aalto.fi](mailto:kirsi.yliniemi@aalto.fi)
- 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)*

## PLEASE NOTE!

- Access to CHEM buildings is automatically linked to Lab Safety Courses
- You must have a Lab Pass before entering the labs of CHEM (more info can be found from course pages)

# CHEM-E0140 Laboratory Safety Course

- 100 % digital course
- You can do it already now!

It allows you to familiarise with the material and take the exam whenever you want:

1. Familiarize yourself with Virtual Lab Space (*link in MyCourses*)
2. Take the digital exam (*in MyCourses*)

**This is for you own safety – and your friends' safety –  
so please, study the material carefully!**

# What to do?

1. **Sign into the course “CHEM-E0140 Laboratory Safety Course” in WebOODI ([oodi.aalto.fi](https://oodi.aalto.fi))**
  - *NOTE! You must have signed in with your Aalto account before you can sign into courses*
2. **Go to the MyCourses page of “CHEM-E0140 Laboratory Safety Course” ([mycourses.aalto.fi](https://mycourses.aalto.fi))**
3. **Follow the link to Virtual Lab Space**
4. **Take the Digital Exam in the MyCourses**
  - *You will be notified immediately whether you passed the exam (to pass: 50 % of the points).*
  - *You can take the exam as many times as you like, but the questions keep changing.*
  - *It is recommended that you have Virtual Lab open at the same time as you take the exam:*
  - ***Try not to just guess → This is for your own safety***

# Pass 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 your Lab Pass visible on your lab coat when entering labs
  - *(Note! The printing is done only after passing the course)*
- Pick up your Lab Pass from the study advisors' pop-up desk (CHEM main lobby, Kemistintie 1)

Study Period when student makes the Lab Safety course	Lab Pass Ready in Study Advisors in CHEM Lobby (after 12 noon)
<b>September Orientation Week</b>	WEDNESDAY 9 <sup>th</sup> September
Period I (1 <sup>st</sup> week)	WEDNESDAY 16 <sup>th</sup> September
Period II (1 <sup>st</sup> week)	WEDNESDAY 4 <sup>th</sup> November
<b>January Orientation Week</b>	WEDNESDAY 13 <sup>th</sup> January
Period III (1 <sup>st</sup> week)	WEDNESDAY 20 <sup>th</sup> January
Period IV (1 <sup>st</sup> week)	WEDNESDAY 10 <sup>th</sup> March
Period V (1 <sup>st</sup> week)	WEDNESDAY 28 <sup>th</sup> April

# 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*
  - Deadline: **7 September 2020**
  - 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€
- It's a fast track to summer jobs at the departments



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

# 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)*
- *Support!*



# 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!***

# Academic advising groups

## **Yongdan Li**

Ingrid Iivarinen  
Jussi Lind  
Abhinash Kumar Singh

## **Pekka Oinas**

Emma Falck  
Paavo Nurmesniemi  
Atte Pakarinen  
Helinä Väätäinen

## **Juha-Pekka Pokki**

Cedric Agyingi  
Maija Hakki  
Roni Nieminen

## **Kaj Jakobsson**

Topias Björkman  
Amanda Ilkko  
Lâm Bao Trân Lê  
Konsta Ojala

## **Jukka Kortela**

Samir Jonne Hassanein  
Otso Koskimies  
Emmi Keitaanniemi  
Jesper Tirronen

## **Sami Lipponen**

Valtteri Siira  
Ville Talikka  
Elina Tupamäki

## **Golam Sarwar**

Gao Ming Jerald Foo  
Peetu Ilola  
Hanna Kääriäinen  
Viktoria Virolainen

## **Reetta Karinen**

Jatta-Juulia Hanski  
Juho Ikonen  
Lotta Pulkkinen  
Ahmed Sajid

# Practical study matters

# 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, WebOodi, SISU

- Read your **aalto.fi e-mails**
  - *Change the password every 6 months*



- 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?

- Possibility to order lab coats and lab goggles: Order form

## Thursday:

- Aalto University Services for Students: **Thu 3.9. 9:00-11:00**  
*(for students from outside Aalto, optional for Aalto bachelors)*

## Friday:

- IT services and enrolment to courses: **Fri 4.9. at 10.00-11.30**  
*(for students from outside Aalto, recommended for Aalto bachelors)*
- TeekkariLife lecture ~30 min  
*(Optional for all, you can watch at any time)*

# Meeting the academic advisors

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

➤ *Break-out rooms*

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

