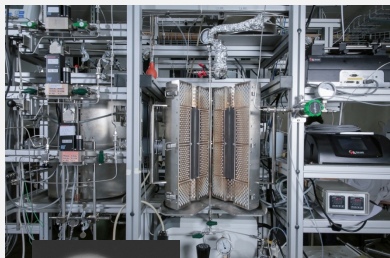


EPFL

CHEMICAL ENGINEERING: labs & project

Master Spring Semester 2024/25



Prof. Jeremy Luterbacher
Head assistant: Elisabetta Bonaglia

TP Assistants:

Atabay Allamyradov
Sylvie Wigmans
Nakul Bapat
Archisman Ghosh
Elisabetta Bonaglia
Antoine Brunel

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The Master level Lab in Chemical Engineering is aimed for the student's **acquisition of professional competence** by:

- i) Use of ***instrumentation and methodologies*** typical in the field.
- ii) Developing ***analytical skills*** by the ***treatment and interpretation*** of experimental data.
- iii) Mastering ***written communication***: *Writing memos and reports* to present the experimental results obtained.
- iv) Developing ***oral communication skills*** by presenting and defending the results /conclusions with an *oral presentation*.
- v) Being able to ***work as part of a team***.

The TP organization allows the students to experience a ***non-technical topic of personal management*** and working within a group.

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Experiments and assistants

Block 1

E 1.1: Heterogeneous Catalysis in Flow Reactors with Mass Transfer effects, *Atabay Allamyradov*

E 1.2: Residence Time Distribution: Liquid Phase Reactor, *Sylvie Bertina Wigmans*

E 1.3: Liquid-Liquid Extraction, *Nakul Abhay Bapat*

Block 2

E 2.1: Transfer Hydrogenation in a Semi-Batch Reactor over a Structured Catalyst, *Archisman Ghosh*

E 2.2: Multiplicity in CSTRs, *Elisabetta Bonaglia*

E 2.3: Liquid-Liquid Separation, *Antoine Albert André Brunel*

Prototyping: *Elisabetta Bonaglia*

3

Organisation of your work in the laboratories:

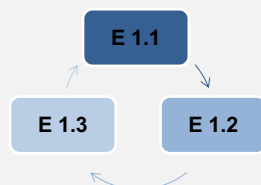


First 2 WEEKS

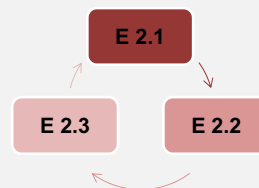
WEEK 1



BLOCK 1



BLOCK 2



4

Organisation of your work in the laboratories:

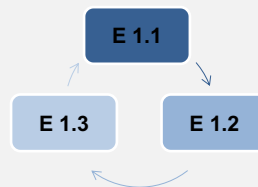


First 2 WEEKS

WEEK 2

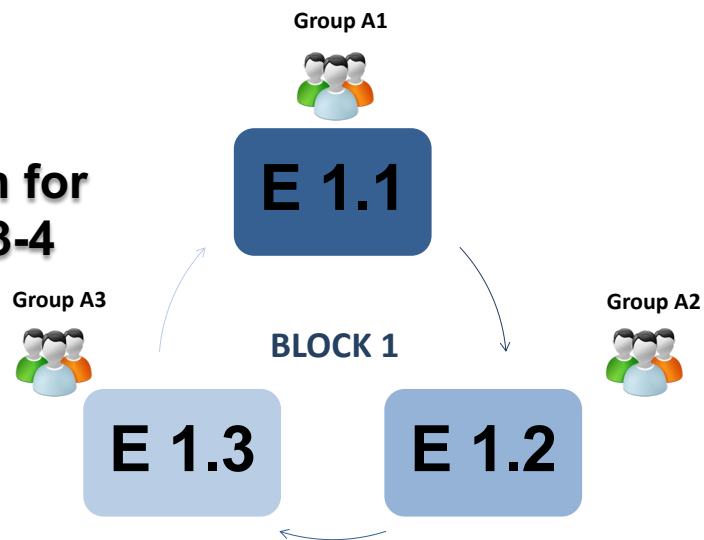
Group B1 Group B2 Group B3

BLOCK 1

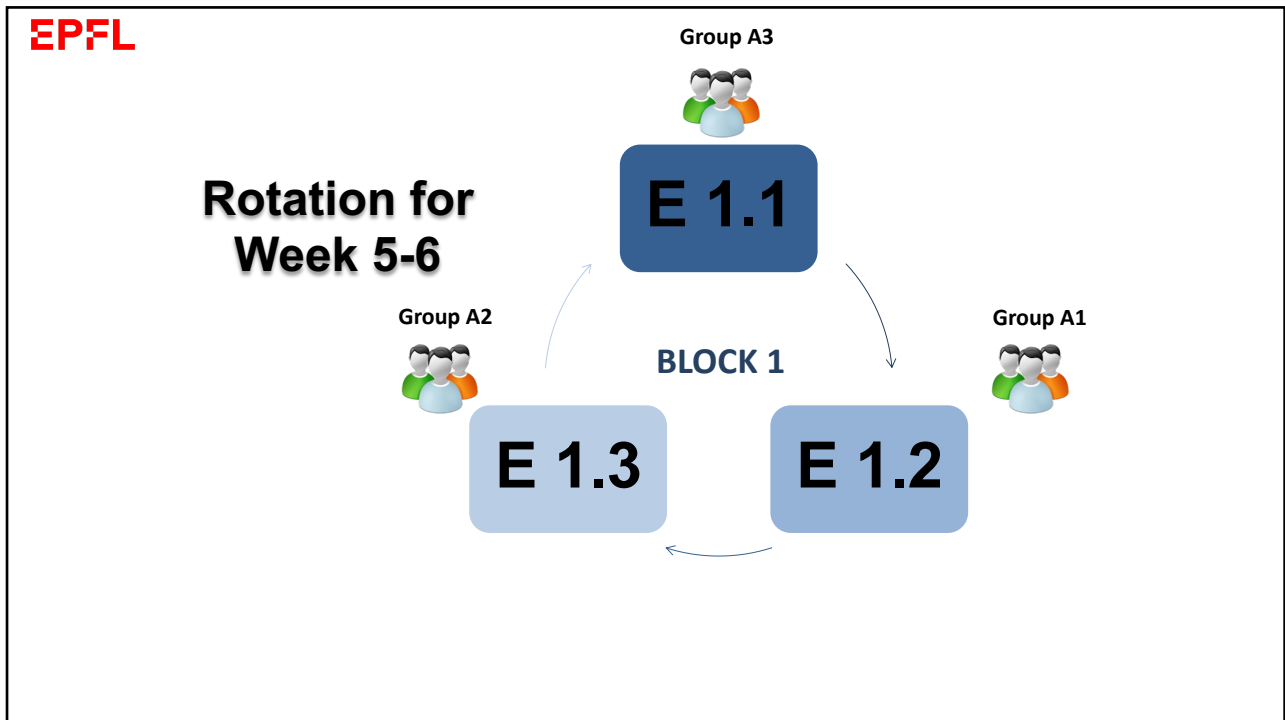


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Rotation for Week 3-4



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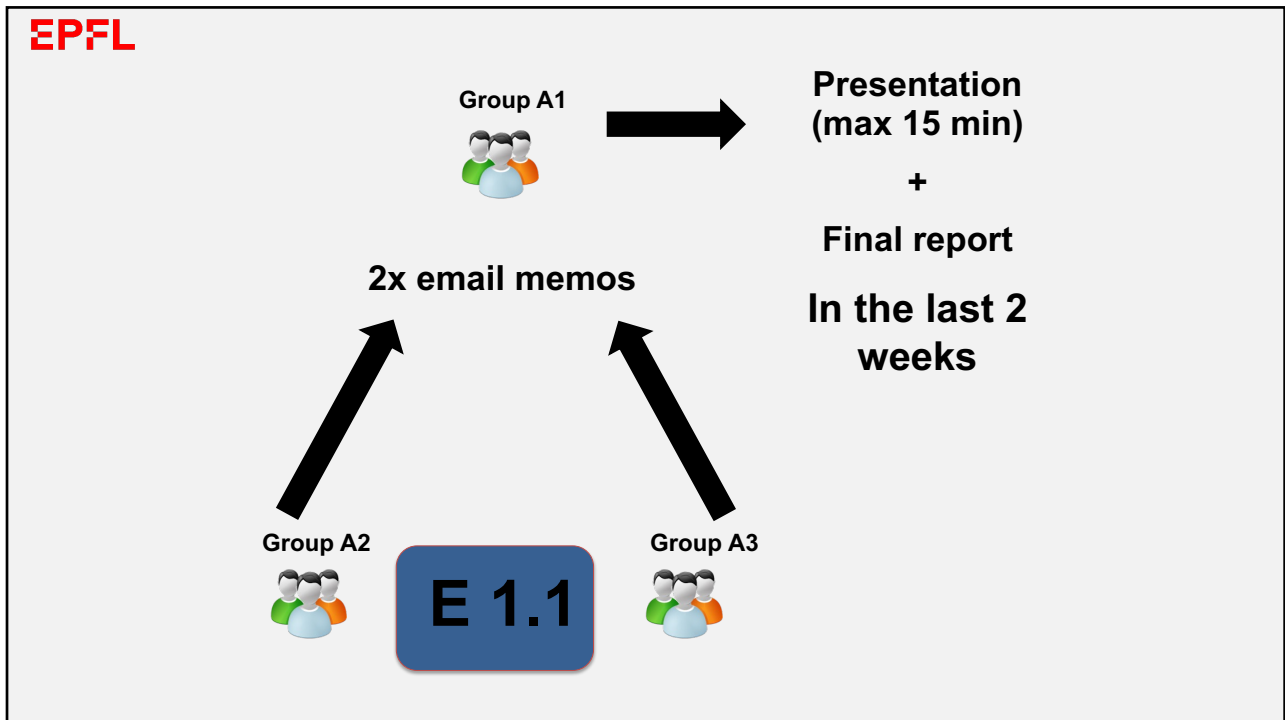
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Leading group

- Your core TP is the TP you are assigned to for the first two weeks
- You will submit an experimental plan that the subsequent groups will follow on the Friday of your second week
- The 2 subsequent groups that will rotate to your core TP will each send you an email memo updating you with results **the Friday following their session**
- Finally, you will prepare a final report for your core TP and prepare an oral presentation for the final 2 weeks of the semester

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Deliverables and grading

- **1 experimental plan** (detailing the tasks you and the other groups will perform, max 2 pages): 10% of the grade
- **3 email-memos** (responding to the task on the experimental plan, max 3 pages): 10% of the grade for each memo
- **(this mark includes the participation grade*)**
- **1 final report** (on the core TP, max 15 pages): 30% of the grade **(this mark includes an assessment of the management**)**
- **1 oral presentation** (on the core TP, max 15 min, followed by questions from assistants and professor): *30% of the grade

* Marks will be given as a team. Only in exceptional cases will team members be given different marks

** Your direction of the two other groups who will work on your core TP will be assessed

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Deliverables and grading

1 experimental plan (detailing the tasks you and the other groups will perform): 10% of the grade

Your experimental plan should contain the following (**maximum 2 pages, everything included**):

1. A brief introduction of your topic (ca 150 words)
2. Overall objectives of the project
3. Weekly experiment plan: you should divide the semester into 6 week periods to reflect the work of the three different groups. For each period you should introduce the objectives, the tasks to be performed and the deliverables that are needed.

Example:

Week 3

Objective: Study of the internal mass transfer limitation in the catalytic gas phase hydrogenation of propene over Pt/SiO₂ with the "Madon-Boudart" test.

Task: Prepare several reactors packed with catalysts with different Pt loading and measure their activity in identical conditions (temperature and propene partial pressure). You can assume a constant Pt -dispersion.

Deliverable: Plot a graph of log(activity) vs log(mass of active phase/total mass of catalyst).

You should have a 1st draft ready for your assistant to make edits **on the Wednesday of your 2nd TP week**. The final version is due the **Friday of your 2nd TP week** and should be forwarded to your assistant and the next two groups who will perform your experiments.

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Deliverables and grading

3 email-memos (responding to the task on the experimental plan, max 3 pages): 10% of the grade for each memo (this mark includes the participation grade*)

Your email-memo should be written as an organized email addressed to your assistant and your leading group (if applicable) and should therefore contain the appropriate salutations and language that you would use in a professional setting. It should also not contain titles or subtitles except in the final part (materials and methods) that are included as an add-on for reference and not as an explicit part of the "story". This format is typical for research memos and short scientific communications:

1. Salutations.
2. Introduction and objectives: it should be brief (e.g. 1-2 paragraphs) and the overall objective should be stated in bold.
3. Deliverables and discussion: Here you should explicitly respond to the deliverables requested in the experimental plan (e.g. *We achieved a performance of X and therefore deliverable J ... was/was not completed*). You should also discuss the resulting experimental data.
4. Conclusions and recommendations: Based on your experience, you can make recommendations to the leading group on how to continue the project or how to interpret the data.
5. Materials and methods: A brief description of the materials and methods used to perform the required tasks. This is the only section that should contain titles and subtitles.

*Maximum 3 pages including figures but not including references (minimum font 11, no weird formatting or no annex documents except for the protocol). See example/template on moodle. **Memos should be sent to the Core TP group as well as the assistants in charge of the TP you are writing the memo about the Wednesday following the session***

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Deliverables and grading

1 final report (on the core TP, max 15 pages): 30% of the grade (this mark includes an assessment of the management**)

The final report should be written like a longer scientific publication (article format). It should contain:

Abstract

1. Introduction
2. Objectives
3. Materials and methods
4. Results and discussion
5. Conclusions

Maximum 15 pages including figures but not including references (no annex documents except for the protocol).

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Schedule 2025

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	13	14	14
	19-Feb	26-Feb	05-Mar	12-Mar	19-Mar	26-Mar	02-Apr	09-Apr	16-Apr	30-Apr	07-May	14-May	20-May	21-May	27-May	28-May
Group	TP Experiment															
A1	E1.1	no class	E1.1	no class	E1.3	no class	E1.3	no class	E1.2	no class	E1.2	no class	report	pres	no class	no class
A2	E1.2	no class	E1.2	no class	E1.1	no class	E1.1	no class	E1.3	no class	E1.3	no class	report	pres	no class	no class
A3	E1.3	no class	E1.3	no class	E1.2	no class	E1.2	no class	E1.1	no class	E1.1	no class	report	pres	no class	no class
B1	no class	E1.1	no class	E1.1	no class	E1.3	no class	E1.3	no class	E1.2	no class	E1.2	no class	no class	report	pres
B2	no class	E1.2	no class	E1.2	no class	E1.1	no class	E1.1	no class	E1.3	no class	E1.3	no class	no class	report	pres
B3	no class	E1.3	no class	E1.3	no class	E1.2	no class	E1.2	no class	E1.1	no class	E1.1	no class	no class	report	pres
A4	E2.1	no class	E2.1	no class	E2.3	no class	E2.3	no class	E2.2	no class	E2.2	no class	report	pres	no class	no class
A5	E2.2	no class	E2.2	no class	E2.1	no class	E2.1	no class	E2.3	no class	E2.3	no class	report	pres	no class	no class
A6	E2.3	no class	E2.3	no class	E2.2	no class	E2.2	no class	E2.1	no class	E2.1	no class	report	pres	no class	no class

Experimental plan:

Show the assistant for feedback on Wed. of the 2nd week. Final draft sent to assistant and future groups the following Friday.

Due:

A: Fri. Mar 7th
B: Fri. Mar 14th

Email-memos:

Are due the Wednesday following the TP session. Send to core TP group and assistant.

- 1st Memo due Wed. Mar 12th(A), Mar 19th (B)
- 2nd Memo due Wed. Apr 9th (A), Apr 16th (B)
- 3rd Memo due Wed. May 14th (A), May 21st (B)

All deadlines are at 17h of the indicated dates.

Presentations will be individually scheduled on the day following the report due date.

Full reports Due Tue. May 20th (A), May 27th (B+prototyping)

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Groups (Based on alphabetical surname order):

Group	Name	Surname	Email	Assistant	Email	Core experiment
A1	Francesco	Barabino	francesco.barabino@epfl.ch	Atabay Allamyradov	atabay.allamyradov@epfl.ch	E1.1
	Emilie Châu-Giang	Tran	emilie.tran@epfl.ch			
	Alina Elizabeth	Canda	alina.canda@epfl.ch			
A2	Thomas-Emmanuel	Coulibaly	thomas-emmanuel.coulibaly@epfl.ch	Sylvie Bertina Wigmans	sylvie.wigmans@epfl.ch	E1.2
	Yuqin-Ada	Lin	yuqin.lin@epfl.ch			
	Léo Arthur Alexandre	Dumond	leo.dumond@epfl.ch			
A3	Juliette Arminda	Etique	juliette.etique@epfl.ch	Nakul Abhay Bapat	nakul.bapat@epfl.ch	E1.3
	César François Manuel	Gaillard	cesar.gaillard@epfl.ch			
	Zahraa Mahmoud Mahmoud	Ghanem	zahraa.ghanem@epfl.ch			
A4	Ana Beatriz	Gonzalez Villaverde	ana.gonzalezvillaverde@epfl.ch	Archisman Ghosh	archisman.ghosh@epfl.ch	E2.1
	Anastassia Chantal Iryna	Gorgeon	anastassia.gorgeon@epfl.ch			
	Thomas Noël	Gruson	thomas.gruson@epfl.ch			
A5	Valentine Eva	Jaussi	valentine.jaussi@epfl.ch	Elisabetta Bonaglia	elisabetta.bonaglia@epfl.ch	E2.2
	Nicolas	Jenni	nicolas.jenni@epfl.ch			
	Jérémy Jean	Joannes	jeremy.joannes@epfl.ch			
A6	Marija	Djukic	marija.djukic@epfl.ch	Antoine Albert André Brunel	antoine.brunel@epfl.ch	E2.3
	Ismael Amadou	Maiga	ismael.maiga@epfl.ch			
	Mathéo François Alexandre	Nonnet	matheo.nonnet@epfl.ch			
B1	Costanza	Piccaluga	costanza.piccaluga@epfl.ch	Atabay Allamyradov	atabay.allamyradov@epfl.ch	E1.1
	Moheb Amir Adel Kamel	Rafia	moheb.rafia@epfl.ch			
	Arthur Joël	Roudaut	arthur.roudaut@epfl.ch			
B2	Charlotte	Bardin	charlotte.bardin@epfl.ch	Sylvie Bertina Wigmans	sylvie.wigmans@epfl.ch	E1.2
	Tom Valentin	Villatte	tom.villatte@epfl.ch			
	Fatima Wissale	Zergot	fatima.zergot@epfl.ch			

Prototyping	
Assistant: Elisabetta Bonaglia	elisabetta.bonaglia@epfl.ch
Blanc Pauline Marie-Charlotte Louisa	paulinemarie-charlottelouisa.blanc@epfl.ch
Ceccucci Anna-Maria Dominique	anna.ceccucci@epfl.ch
Ryser Jonathan	jonathan.ryser@epfl.ch

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Laboratory Safety

- ☐ **Proper handling** of equipment and chemicals
- ☐ **Prevents harm** to yourself, others and property

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General Basic Rules

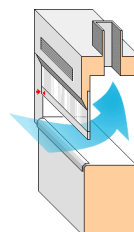
- ☐ No food or drinks in the laboratory
- ☐ Keep working areas clean
- ☐ Do not leave any items of value in the laboratory
- ☐ Wear personal protective equipment



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Using and Disposing of Material

- ☐ Label all beakers, flasks, test tubes, etc.. clearly indicating the content
- ☐ Use fume hood if working with hazardous chemicals to prevent inhalation of harmful fumes
- ☐ Dispose material and chemicals in pertinent container (ask Assistant)



Organics






Broken Glass

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Emergency Procedure

*You **MUST** report ALL*


- ☐ **Accidents / Injuries**

- ☐ **Spills**

- ☐ **Fire**


Who to contact?

Elisabetta Bonaglia

Room CH H2 555

Tel. + 41 216955931



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Emergency Number
Located in the laboratories, lift, etc..

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First Aid

Injury :
Cuts and/or bruises




Action :
Contact Assistant
Seek medical attention

First Aid Kit

Location:
In all laboratories

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First Aid

Injury : Spill chemicals in your eyes/body or burn yourself

Action : flush with **water** for **15 minutes** and seek for **medical attention**.

❑ **Taps**



Location:
In all laboratories

❑ **Eye Wash**



Location:
In all laboratories

❑ **Safety Shower**



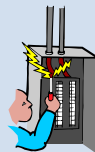
Location:
In main corridor

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First Aid

Injury: Electrical Shock

Action:
Switch off current
Alert Assistant



Location:
Main source in
corridor

Injury: Fire



Actions:

Important Signs



Exit



Stairways only



Meeting point

Alarm
(fire button)



Location:
Corridor

Help people in danger
(fire blanket)



Location:
In all the laboratories

Use extinguishing
system



Location:
Laboratories and/or corridor

Inform
firemen



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Before Leaving

Turn Off:

Gas
Water
Pressure Lines
Power Supplies
Heating
Apparatus



Working Place:

Clean and Tidy
Dispose Properly Waste