

ChE-409

**Chemical engineering lab & project**

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| Cursus     | Sem.     | Type |
|------------|----------|------|
| Ing.-chim. | MA1, MA3 | Obl. |

|                            |                     |
|----------------------------|---------------------|
| Language of teaching       | English             |
| Credits                    | 3                   |
| Session                    | Winter              |
| Semester                   | Fall                |
| Exam                       | During the semester |
| Workload                   | 90h                 |
| Weeks                      | 14                  |
| <b>Hours</b>               | <b>4 weekly</b>     |
| TP                         | 4 weekly            |
| <b>Number of positions</b> |                     |

**Summary**

Familiarization with practical aspects encountered in chemical reaction engineering. A research project is carried out along twelve weeks where a close interaction is required between the different groups.

**Content**

- Kinetics of gas/solid reactions (tubular reactor; mass-transfer influence on the global kinetics; heterogeneous catalyst characterization)
- Three phase reaction in a semi-batch reactor (internal & external mass-transfer, intrinsic kinetics study and modeling, and apparent activation energy; catalyst testing)
- Micro-reaction technology: macro & micro-mixing; segregation, micro-heat exchange, etc.
- Transient kinetics of heterogeneous reactions: Temperature programmed reaction/desorption (TPD/TPR), Transient response method, Residence time distribution (RTD).
- Thermal behaviour and parameter sensitivity of a highly exothermic reaction (runaway, heat management in batch & semi-batch reactor, optimized performance, etc...)

**Learning Prerequisites****Recommended courses**

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**Learning Outcomes**

By the end of the course, the student must be able to:

- Plan experiments during a semester to reach a well-defined goal
- Organize the lab work for the good unwinding of the project
- Formulate the tasks and objectives from one week to the other
- Represent adequately experimental data in a conventional scientific and technical form
- Manage the task force within a team

- Interpret experimental results with a critical mind
- Structure the report in a clear and well-thought manner
- Defend the project in front of an informed audience

### **Transversal skills**

- Assess progress against the plan, and adapt the plan as appropriate.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Communicate effectively, being understood, including across different languages and cultures.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Negotiate effectively within the group.
- Write a scientific or technical report.
- Make an oral presentation.
- Respect the rules of the institution in which you are working.
- Take responsibility for environmental impacts of her/ his actions and decisions.

### **Resources**

#### **Websites**

- [http://scgc.epfl.ch/telechargement\\_cours\\_chimie.htm](http://scgc.epfl.ch/telechargement_cours_chimie.htm)