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

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