Sustainable Metals Processing

Code: CHEM3035

Extent: 20–25 cr

Language: English

Professor in charge: Michael Gasik

Target group: Master's students

Application procedure: Open for all students of Aalto University.

Quotas and restrictions: Please note, that in some courses the number of participants can be limited. Then major students (Sustainable Metals Processing) have the priority.

Prerequisites: While making your study plan, you should verify that you have the prerequisites needed for the courses.

Learning outcomes

The core scientific and engineering knowledge to be obtained include chemical thermodynamic, phase equilibrium and property calculations. The students shall possess adequate knowledge of chemical kinetics in various fields related to metallurgical processing industries. The students shall understand chemical equilibria, process dynamics, system engineering and their connections to process design, the best practices and flow-sheet integration. They shall also understand the societal, economic and environmental impacts of processes related to metal making based on systems thinking.

The key skills to be developed include systems thinking and engineering and their connections to process design, the best practices and flow-sheet integration, linking product design and geology to metal production in a sustainable way, especially links to energy recovery as well as water recycling. The students shall be capable to make experimental studies on metals extraction reactors and unit processes at low and high temperatures, gather data and evaluate process performance.

Content and structure of the minor

Minor (20–25 cr) can be any combination of courses belonging to the Sustainable Metals Processing major. Please check the list below.

Structure of the minor

Code	Name	Credits	Period
Elective courses		20–25	
Choose so many courses below that the Minor will be at least 20 cr			
CHEM-E6100	Fundamentals of Chemical Thermodynamics	5	I
CHEM-E6120	System Integrated and Sustainable Metals Production	5	II
CHEM-E6140	Fundamentals of Minerals Engineering and Recycling	5	I
CHEM-E6160	Fundamentals of Pyrometallurgy	5	II
CHEM-E6180	Fundamentals of Hydrometallurgy	5	I–II
CHEM-E7130	Process Modeling	5	II
CHEM-E6225	Technical Innovation Project	10	I–II
CHEM-E6105	Thermodynamics of Solutions	5	III - V
CHEM-E6115	Thermodynamics of Modeling and Simulation	5	III - V

CHEM-E6215	Circular Economy Design Forum P	5	I V - V
CHEM-E6235	Circular Economy for Materials Processing	5	III - IV
CHEM-E6165	Unit Processes in Pyrometallurgy	5	III - IV
CHEM-E6205	Metallurgical Engineering Project Work	5	I V - V
CHEM-E6185	Applied Electrochemistry and Corrosion	5	III - IV
CHEM-E6195	Unit Processes and Systems in Hydrometallurgy	5	I V - V
CHEM-E7150	Reaction Engineering	5	III
CHEM-E7120	Laboratory Project in Chemical Engineering	5	I-II
CHEM-E6210	Individual Research Project	5	I-II, III - IV or V