

EMC Orientation

Pyrometallurgy

27.08.2024

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European Mining Course

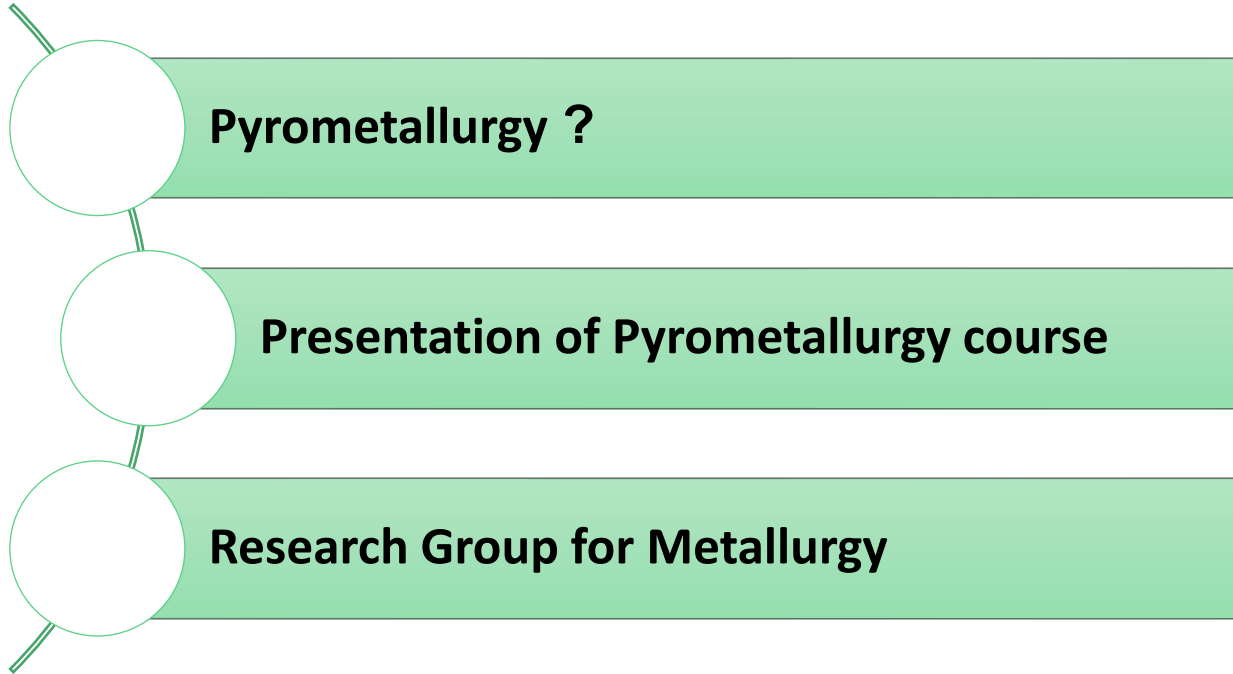
Aalto University

Code	Name	ECTC	Period
GEO-E2030	Rock Mechanics	5	I
CHEM-E6111	Engineering Principles for Metallurgical Processes	5	I
CHEM-E6140	Fundamentals of Minerals Engineering and Recycling	5	I
CHEM-E6160	Fundamentals of Pyrometallurgy	5	II
GEO-E3010	Economic Geology and Mineral Economics	5	II
GEO-E3050	Field Experience and Project in Hard Rock Mining	2	II
LC-1317	Integrated Project Communication for MSc Students	3	II

- ❑ CHEM-E6111 aims at preparing students for fundamental courses!

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Content

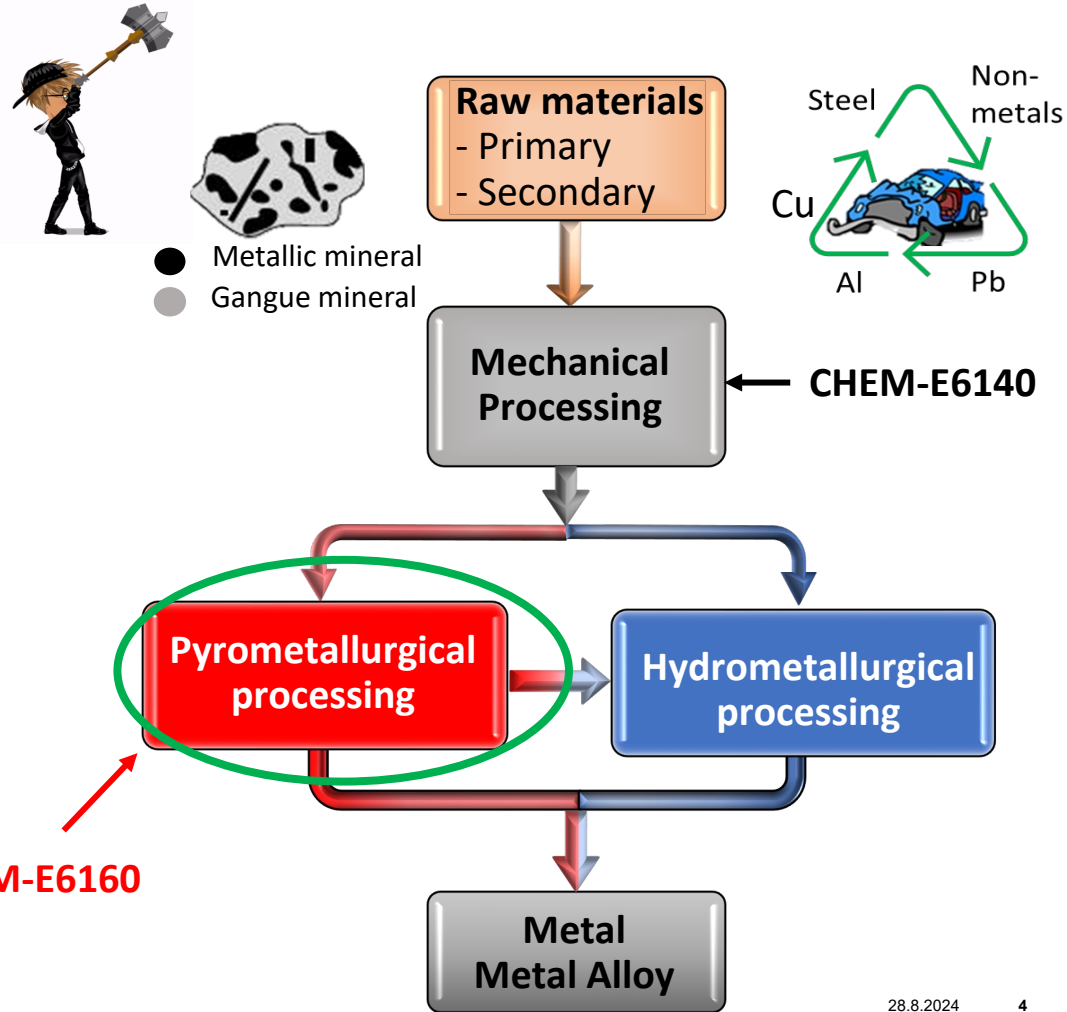


Metallurgical Processes for Metals Extraction & Refining

❑ Raw materials are converted to pure metals or alloys through several processing steps.

❑ Pyrometallurgical processing

➤ A key technology for the production and recycling of metals.



Pyro/Pyrometallurgy ?

- ❑ The word pyro derived from a Greek word which means fire.
- ❑ **Pyrometallurgy**
 - Extracting and refining metals from primary and secondary raw materials at high temperatures.



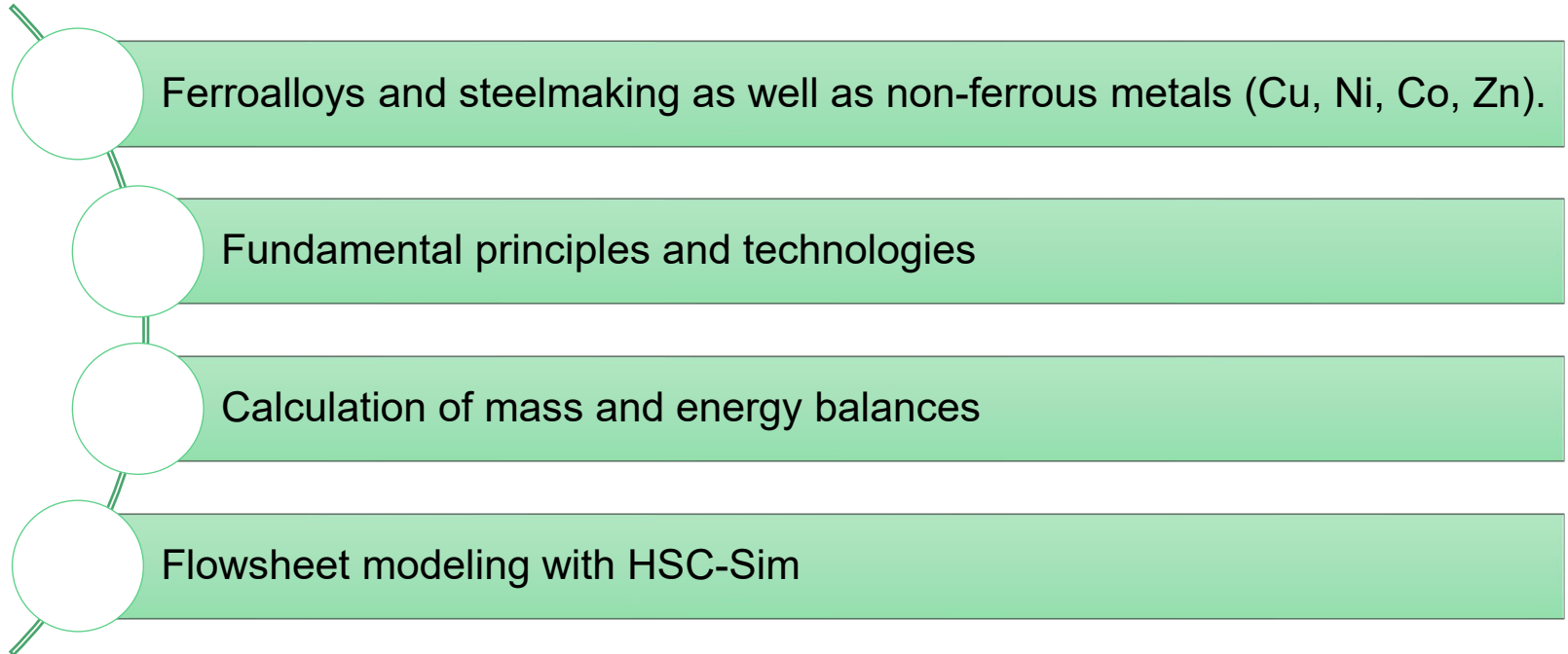
- No formal limits to the temperatures that are used in Pyrometallurgical processing.
 - *In practice most processes are carried out between **300 - 2000°C**.*

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CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

Content

- The course gives an overview of the **most important high-temperature metal making processes.**



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CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

Teachers

- ❑ **Assistant Prof. Min-Kyu Paek**

- Teacher in charge
- Lectures



- ❑ **Marko Kekkonen**

- Lectures + Exercises



- ❑ **Guest lecturers from industry**

- Boliden, Metso, ...

CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

Schedule

❑ **Teaching Period II:** 21.10.2024 - 3.12.2024

➤ **Registration in Sisu:** 23.9.2024 →

❑ **Lectures**

➤ Mon 10:15 - 12:00

➤ Thu 16:15 - 18:00



❑ **Exercises**

➤ Wed 12:15 - 15:00

➤ Fri 10:15 - 13:00

❑ **Exam**

➤ Tue 3.12.2024, 09:00 - 13:00, Lecture hall Ke1

❑ **Detailed schedule will be added to MyCourses frontpage**

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CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

Pre-Assignment

- ❑ **To collect your**
 - pre-existing knowledge of the course topics
 - expectations and learning goals for the course

- ❑ **Should be completed before the course starts**
 - MyCourses questionnaire will be open latest at the beginning of October.

CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

Requirements

❑ Compulsory Project Work

- HSC-Simulation + Report
- Will be carried out in groups of 2 students.

❑ Open-book Exam

- Tue 3.12.2024 9:00 - 13:00, Ke1
- Theory and Calculation tasks



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CHEM-E6160 Fundamentals of Pyrometallurgy (5 cr)

- ❑ **Follow the MyCourses page**

- <https://mycourses.aalto.fi/course/view.php?id=45119>

- ❑ **Contact:**

- Marko Kekkonen

- Kemistintie 1, room F302

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Research Group for Metallurgy

□ Assistant Professor Min-Kyu Paek

➤ September 1, 2024 →



□ **Activities cover** Sustainable production of metals from

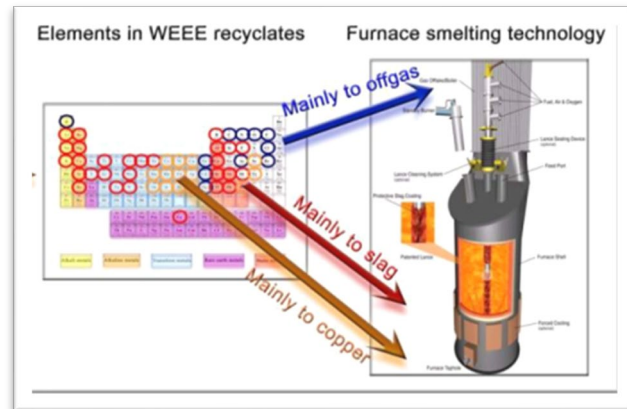
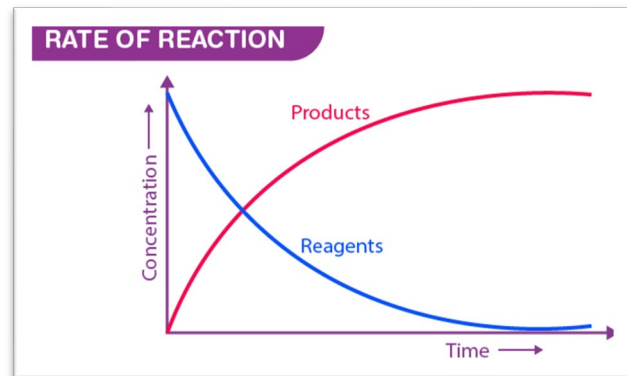
- Low grade and complex ores
- Metal-bearing scrap or waste

□ **Experimental research focuses on**

- kinetics of metallurgical reactions
- distribution of elements in metallurgical melts

□ **Modelling** of flow and heat transfer phenomena and chemical kinetics of pyrometallurgical processes.

□ **The main emphasis** is on better understanding of metallurgical phenomena by combining experimental studies with computer simulation and modelling.



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Kiitos
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