JÖNKÖPING UNIVERSITY
School of Engineering

COURSE SYLLABUS

Science of Remelting: Ferrous Alloys, 2.5 credits

Vetenskapen om omsmältning av järnlegeringar, 2.5 högskolepoäng

Course Code:	TFER25	Education Cycle:	Second-cycle level
Confirmed:	Feb 01, 2025	Disciplinary domain:	Technology
Valid From:	Sep 01, 2025	Subject group:	Materials Technology
		Specialised in:	A1N Second cycle, has only first-cycle course/s as entry requirements
		Main field of study:	Product Development

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and understanding

• display knowledge of how to prepare a charge material for casting of ferrous metals
• demonstrate comprehension of the industrial practice for the treatments of the ferrous alloys' melts

Skills and abilities

• demonstrate skills of analyzing the data from a cooling curve and assess the formation of the microstructure.

Judgment and approach

• demonstrate the ability to evaluate the efficiency of different melting methods and alloy additions

Content

The course is designed to familiarize students with theoretical/practical contexts for the sustainable melting and remelting of cast iron and steels, the main characteristics of iron-based alloy melting, and their importance on the circularity. The students will get familiar with different methods of melting and casting steel and cast iron. The course also focuses on the quality control methods. Other relevant concepts including CO2 emission and Carbon Border Adjustment Mechanism (CBAM) rules will be discussed.

The course includes the following elements:

- Fundamentals of Ferrous Metallurgy.
- Melting technology of Cast Iron (Melting furnaces, melting methods, charge optimization).
- Liquid treatment and Ladle metallurgy (Alloying, desulfurization, inoculation, modification).
- Quality control of the liquid iron (Chemical analyses, dissolved gas analyses, test of fluidity, cooling curve and volume change analyses).
- Quality control by characterization of cast iron (Wedge tests, characterization of cast iron by morphology).
- Elaboration of steel for shape casting (Melting, charge, de-oxidation and other treatments, control methods).

Type of instruction

Lectures, assignments, seminars and a laboratory session.

Language of instruction is in English.

Entry requirements

Academic degree of at least 180 ECTS credits within Engineering and/or Technology or Passed courses of at least 40 credits in the main field of study within Engineering and/or Technology and at least 1 year of work experience in the manufacturing industry or At least 4 years of work experience in the manufacturing industry Proof of English proficiency is required.

Examination and grades

The course is graded Pass (G) or Fail (U).

The final grade will be issued after satisfactory completion of all mandatory examination elements.

Registration of examination:

Name of the Test	Value	Grading
Assignment	2.5 credits	G/U

Course literature

Please note that changes may be made to the reading list up until eight weeks before the start of the course.

The literature list for the course will be provided eight weeks before the course starts.

1. ASM Metals Handbook Volume 1
2. ASM Metals Handbook Volume 3
3. ASM Metals Handbook Volume 9
4. ASM Metals Handbook Volume 15
5. John Campbell: Castings
6. John Campbell: Complete Casting Handbook

The ASM handbooks are available as an online e-book free of charge for students via the homepage of the university library. Please visit the following link for the same.
http://products.asminternational.org/hbk/index.jsp