



CURRICULUM – THIRD-CYCLE EDUCATION

**Light metal, 7.5 higher education credits**

*Lättmetall, 7,5 högskolepoäng*

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<b>Education Level:</b>	Third-cycle education
<b>Area of degree</b>	Industrial Product Realisation
<b>Research subject:</b>	Materials and manufacturing
<b>The course applies from</b>	Course syllabus reviewed by RUF 2012-10-19, established 2013-11-14 by the dean (vd-beslut 2013/096)

**Learning Outcomes :**

On completion of the course the student should:

*Knowledge and understanding*

- Have knowledge of solidification and alloy design
- Have knowledge about control of properties in the casting process
- Understand how a component's life is affected by material defects and design

*Skills and abilities*

- Be able to describe how light metals such as magnesium and aluminum alloys are made and how their material properties because of the casting process
- Be able to describe and analyze the mechanical properties at both room temperature and at high temperatures

*Judgement and approach*

- Have a good overview of the current use of light metals and have a picture of the trends and thus be able to criticize and evaluate models for microstructure formation and properties specifically for light metals

**Contents**

The course aims to give students basic and advanced knowledge of component manufacturing from preparation and mould filling to finished component, including design, material properties and manufacturing processes. The course will give good skills in order to describe and model the transport phenomena and precipitation kinetics.

The course covers the following topics:

- The use and development trends for light metals use.
- Basic solidification theory and specific courses of technically important light metals such as magnesium and aluminum alloys, and the use of phase diagrams as tools for describing solidification
- Alloy types and their microstructure
- The link between microstructure and physical and mechanical properties,
- Defect Formation, shrinkage and gas porosity



- Property Management through grain refinement and heat treatment
- Properties at high temperatures.
- Practical testing and interpretation of the tensile test
- A practical test for measuring an chemistry and physical properties
- Simulation and prediction of the properties for the assessment of a component's properties and strength
- New processes like semi - solid casting

### **Instruction**

Lectures , tutorials (and literature ) , and assignments. Teaching is conducted in English..

### **Prerequisites**

Admission to postgraduate studies or equivalent qualification with basic material science training.

### **Assessment and Ratings**

The course will be graded Pass (G) or Fail (U).

<b>Examination</b>	<b>Credit</b>	<b>Grade</b>
Compulsory lectures	2 hp	U/G
Laboratory	0.5 hp	U/G
Assignments	5 hp	U/G

### **Reading List**

Polmear, I. J. (1995 eller nyare). Light Alloys: Metallurgy of the Light Metals (3rd ed.). Butterworth-Heinemann. ISBN 978-0-340-63207-9.

Hand outs such as journal articles and own literature search