



## COURSE SYLLABUS

# Materials and Manufacturing Technology, 7.5 credits

*Material och Tillverkningssteknik, 7,5 högskolepoäng*

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<b>Course Code:</b> TTTR21	<b>Education Cycle:</b> Second-cycle level
<b>Confirmed by:</b> Dean Mar 1, 2021	<b>Disciplinary domain:</b> Technology
<b>Valid From:</b> Aug 1, 2021	<b>Subject group:</b> MA2
<b>Version:</b> 1	<b>Specialised in:</b> A1N
	<b>Main field of study:</b> Product Development

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### Intended Learning Outcomes (ILO)

After a successful course, the student shall:

Knowledge and understanding

- show familiarity with materials behaviour in manufacturing processes
- show familiarity with sustainability aspects of manufacturing technologies

Skills and abilities

- demonstrate skills of explaining and analysing the principles of various manufacturing processes for metallic components
- demonstrate the ability to understand and quantitatively describe mechanics and physics of the interaction between manufacturing process, material and resulting component characteristics
- demonstrate the ability of selecting proper characterization techniques and analysing the results for understanding the material behaviour before, during and after manufacturing processes

Judgement and approach

- demonstrate the ability to quantitatively determine the capabilities of manufacturing technologies for production of metallic components

### Contents

The course includes:

This course is intended to develop a deeper understanding of the relationship between manufacturing processing and materials properties for metallic components. It covers various manufacturing methods including casting, forming, and powder metallurgy, as well as secondary processing such as welding and machining, and coating. Some advanced manufacturing techniques such as additive manufacturing of metals will be also covered. For each manufacturing method, the covering aspects include principles, choices of materials, choice of processes, properties of materials, advantages and disadvantages, relative process economics and sustainability aspects. Examples are drawn from manufacturing processes mainly used in aerospace, automotive, electronics, and power generation sectors, as the main end-users.

The course includes the following items:

- Overview of materials (metals and alloys) selection and identification
- Overview of materials characterization and testing
- Detailed understanding of manufacturing methods to cast, form, and add/remove materials to/from the finished component
- Mechanics and physics of the interaction between manufacturing process, material and resulting product characteristics

### **Type of instruction**

Lectures, laboratory sessions, project work and assignments/quizzes.

The teaching is conducted in English.

### **Prerequisites**

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics and proof of English proficiency is required (or the equivalent).

### **Examination and grades**

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Examination <sup>†</sup>	3 credits	5/4/3/U
Laobartory and projectwork	3 credits	U/G
Assignment and quiezzes	1.5 credits	U/G

<sup>†</sup> Determines the final grade of the course, which is issued only when all course units have been passed.

### **Course literature**

Course literature is determined one month before the course starts.

Literature (tentative):

- S. Kalpakjian and S.R. Schmid, Manufacturing Engineering and Technology, 6th ed, 2009, ISBN-13: 9780136081685.
- Hand-outs