



## COURSE SYLLABUS

# Materials in Product and Manufacturing Technology, 15 credits

*Material i produkt och tillverkningsprocess, 15 högskolepoäng*

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<b>Course Code:</b> TTSK10	<b>Education Cycle:</b> First-cycle level
<b>Confirmed by:</b> Dean Oct 29, 2021	<b>Disciplinary domain:</b> Technology
<b>Revised by:</b> Director of Education Oct 15, 2024	<b>Subject group:</b> MT1
<b>Valid From:</b> Jan 1, 2025	<b>Specialised in:</b> GIF
<b>Version:</b> 3	<b>Main field of study:</b> Mechanical Engineering

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### Intended Learning Outcomes (ILO)

After completing the course, the student should

#### Knowledge and understanding

- display familiarity with the relationships between the composition, microstructure and properties of materials
- display knowledge of the material groups metals, ceramics and polymers and related manufacturing technologies
- demonstrate comprehension of process selection in connection with sustainable product development based on the material properties and the capacity and limitations of the manufacturing processes
- display familiarity with materials' behaviour in manufacturing processes
- demonstrate comprehension of theoretical concepts related to manufacturing processes
- display knowledge of corrosion and degradation of materials

#### Skills and abilities

- demonstrate skills of independently calculating basic power or energy consumption in different manufacturing processes
- demonstrate the ability of explaining and analysing the principles of different manufacturing methods
- demonstrate the ability of identifying properties of a design that affect the process selection

#### Judgement and approach

- demonstrate the ability to critically compare and select suitable materials and manufacturing processes for metallic, polymeric and ceramic components.

### Contents

The course deals with the relationship between manufacturing methods and material properties. It covers various manufacturing methods, including casting, forming, welding, machining, 3D printing, surface coating and composite/polymer manufacturing. For each manufacturing method, aspects such as theoretical principles, process selection, material properties, advantages

and disadvantages, and economic aspects are covered. Examples are based on manufacturing methods used mainly in the aerospace, automotive and marine industries.

The course contains the following elements:

- Material groups (metals, polymers, ceramics) and their properties
- Material testing
- Manufacturing methods for shaping, processing, joining and coating the final product
- Basic relationship between manufacturing method, material properties and product requirements

### Type of instruction

Lectures, laboratory work, project work and assignments.

The teaching is conducted in English.

### Prerequisites

General entry requirements and taken courses in Calculus in One Variable (MSc), 7.5 credits, and Thermodynamics and Energy Engineering, 7.5 credits, (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 part A <sup>†</sup>	3.5 credits	5/4/3/U
Examination part B <sup>†</sup>	4 credits	5/4/3/U
Laboratory Work and Project Work	4 credits	U/G
Assignments	3.5 credits	U/G

<sup>†</sup> The course's final grade is a combination of the results of the exam parts A and B. The final grade is only issued when all parts have been approved.

### Course literature

The course literature is determined 8 weeks before the course starts.

Title: Manufacturing Engineering and Technology in SI units, 8th ed

Authors: S. Kalpakjian and S.R. Schmid

ISBN-13: 9781292422244.