

**SYLLABUS**

# **Metal Working 7.5 credits**

## **X7001T**

**Metallbearbetning**

**Course syllabus admitted: Spring 2023 Sp 3 - Spring 2024 Sp 4**

**DECISION DATE**  
**2023-06-15**

# Metal Working 7.5 credits X7001T

## Metallbearbetning

### Second cycle, X7001T

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Materialteknik	Materials Technology

## Entry requirements

90 hp of which basic knowledge in materials technology and physics must be included.

## Selection

## Course Aim

Divided in three categories below, after finishing this course the student should be able to:

### 1 Knowledge and understanding

- Analyse the behaviour of metals during metal working with regards to both material- and process dependent parameters
- Describe the characteristics, basic concepts, and definitions of different metal working methods
- Draw conclusions about the microstructure's dependence on the metal working method
- Predict challenges related to different metal working processes
- Show knowledge of simple empirical and semi-empirical methods for different metal working techniques, as well as exemplify when FEM modelling can be used for metal working

### 2 Skills and abilities

- Show the ability to make an engineering in-depth reasoning, verbally and/or in writing, about the effect of the different metal working techniques on the final product's microstructure, and properties.
- Describe the assumptions done in a process simulation and be able to assess the relevance of it
- Formulate a computer model for flat rolling using a commercial finite element code.

### 3 Judgement and approach

- Identify process losses in different processing methods to be able to optimize metal working techniques and thereby improve economy and reduce negative environmental impact

## Contents

The course includes metal working of products with the main focus on rolling.  
The following parts are included in the course:

- Main Characteristics of Steel
- Fundamentals of Metalworking
- Metallurgical Aspects of Hot Rolling
- Thermomechanical Treatment During Rolling and Cooling
- Properties of Flat Rolled Products
- Introduction to FEM Simulations of Rolling
- Treatment of Plasticity in FEM
- Rolling Simulations using FEM

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The course consists of lectures, quizzes, computer exercises, seminar assignments and a written laboratory report. The laboratory report and seminar assignments are performed in groups.

## Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. The examination consists of tests, lab assignments and seminars.

## Remarks

The course is given in English.

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Test	G U 3 4 5	2.5	Mandatory	S23	
0004	Laboratory work	G U 3 4 5	2	Mandatory	S23	
0005	Seminars	U G#	3	Mandatory	S23	

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Last revised

by Mats Näsström, acting Head of Undergraduate Education 2023-06-15

## Syllabus established

by Niklas Lehto 2022-02-02