

SYLLABUS

Additive Manufacturing - Process, Material, Product 7.5 credits T7027T

Additiv Tillverkning - Process, Material, Produkt

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2021-02-17**

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Additiv Tillverkning - Process, Material, Produkt

Second cycle, T7027T

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Maskinteknik	Mechanical Engineering

Entry requirements

Basic courses in physics (equivalent to MTF096/F0004T, MTF098/F0006T - mechanics, thermo dynamics), i manufacturing processes (equivalent to T0013T/T0019T/T0017T), in solid mechanics (equivalent to M0011T), Mechanical components (M0012T) and material science (equivalent to T0004T). Equivalent of English 6/English Course B.

Selection

The selection is based on 30-285 credits

Course Aim

Divided into three categories below, you as a student after completing the course will have:

1. Knowledge and understanding

- Remember and be able to describe the principle of the most common methods of additive manufacturing, their possibilities and limitations (geometric, material and mechanical properties and eco-)
- Have insight into and be able to account for how the material structure obtained through additive manufacturing affects the mechanical properties of a component and what role the component's design plays in this

2. Skill and ability

- Be able to search for, select, motivate and defend a chosen manufacturing method, e.g. based on the component's functional requirements, geometry, material and manufacturing volume
- Be able to, based on component functionality, create solutions for how a component's design can and needs to be adapted for the selected additive manufacturing method
- Be able to perform simulations for the stress fields that arise in components during manufacturing and thereby determine required design changes
- Be able to explain additive manufacturing methods orally and in writing
- Be able to give constructive criticism about explanations of additive manufacturing methods and corresponding report layout

3. Judgment and attitude

- Reflect on and evaluate one's own efforts in group work and draw conclusions to improve this for future work

Contents

Overview of the most common additive manufacturing (AM) methods, especially L-PBF (Laser Powder Bed Fusion), including:

- Concepts, definitions and techniques within AM
- Applications for AM in terms of product types, series sizes, etc.
- Advantages and disadvantages of each AM method, also in relation to traditional manufacturing processes
- Design technical conditions for AM
- Thermomechanical calculation methods for AM processes
- Materials and powder technology basics within AM
- Case studies - development / adaptation of metallic products for AM

In addition to course material, the student is expected to find and use external material

Realization

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

Teaching and learning takes place through own studies, submission of compulsory course-wide assignments and laboratory work (s) in groups of normally 4-6 students. The course also conducts a longer case study with normally 36 participants per group (component design for AM), with both oral and written presentation.

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. Continuous examination. Rules for differentiated grades are given during the start of the course, where a higher effort is usually required from a student for higher grades.

For final grades, approved laboratory work and project work are also required.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	1	Mandatory	A18	
0003	Project work	G U 3 4 5	2.5	Mandatory	A18	
0005	Continuous examination	G U 3 4 5	4	Mandatory	A21	

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 Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

by Mats Näsström 2018-02-15