Continuum Mechanics 7.5 credits F0030T

Kontinuumsmekanik

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2021-02-17

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Continuum Mechanics 7.5 credits F0030T

Kontinuumsmekanik

First cycle, F0030T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Teknisk mekanik	Engineering Physics

Main field of study

Engineering Physics and Electrical Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and M0029M Calculus,M0030M Linear Algebra and Calculus, M0031M Linear Algebra and Differential Equations. Vector calculus from M0032M Functions of Several Variables and Computer Tools , Mechanics from F0004T Physics 1 and F0006T Physics 3
or equivalent.

Selection

The selection is based on 1-165 credits.

Course Aim

After completing the course, the student should be able to

1.   *Knowledge and understanding*

- describe basic physical concepts in continuum mechanics
- account for derivations of e.g. continuity and momentum equations as well as constitutive relationships

2.   *Competence and skills*

- use basic theoretical methods for analysis in solid and fluid mechanics
- apply these methods to technically important cases such as bending of beams and pipe flow
- carry out measurements with the aim of 1) investigating the relationship between strain and tension with the aid of strain sensors; 2) connect phenomena in pipe flow to measurable quantities such as pressure drop and flow

3.   *Judgment and approach*

- identify relevant phenomena, boundary conditions, methods and limitations for calculations in continuum mechanics and, based on given conditions, evaluate and interpret the result.

The purpose of the learning objectives is to prepare the student with basic theoretical knowledge for future studies and work linked to analytical methods, numerical methods (eg FEM and CFD) and experimental analysis in solid and fluid mechanics.

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Contents

The course deals with basic principles in continuum mechanics. The course mainly consists of three parts;

General part (integrated in solid- and fluid mechanics): Vectors and tensors.

Solid mechanics: Tension. Kinematics; deformation, strain. Constitutive relationships. Applied problems.

Fluid mechanics: Statics. Kinematics; material derivatives, continuity, Bernoulli's equation, Navier -Stokes equations. Control volume formulation of momentum laws. Applied problems.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
The teaching takes place in the form of lectures, lessons and laboratory experiments. The lectures highlight and explain important elements in the course. Lessons include some theory and exercises to complement the lecture elements. The laboratory work aims to put the theory in a context and to introduce the student to relevant experimental methods.

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 learning objectives are examined through a written individual exam (U, 3, 4, 5) and laboratory work (U / G) with compulsory attendance. All included examination parts must be completed for the student to attain a final grade on the course.

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.

Remarks

This course cannot be part of the degree together with other basic courses in Solid Mechanics or Fluid Mechanics for example M0011T Strength of Materials and Solid Mechanics or F0031T Hydromechanics.

Overlap

The course F0030T is equal to F0059T, MTM113

Course offered by

Department of Engineering Sciences and Mathematics

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Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	0.6	Mandatory	A07	
0003	Written exam	G U 3 4 5	6.9	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

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.

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