SYLLABUS

Structural Models in Solid Mechanics 7.5 credits M7005T

Modeller inom solidmekaniken

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2022-02-14

Luleå University of Technology 971 87 Luleå, Sweden
Phone: +46 (0)920 49 10 00 • Corporate Identity: 202100-2841

LULEÅ TEKNISKA UNIVERSITET

Structural Models in Solid Mechanics 7.5 credits M7005T

Modeller inom solidmekaniken

Second cycle, M7005T

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

Entry requirements

Technical university basic course in strength of materials, solid mechanics or continuum mechanics, e.g. MTM118/M0011T or MTM113/F0030T at LTU.

Selection

The selection is based on 30-285 credits

Course Aim

The student shall be able to - apply the elementary theory of in-plane and transversally loaded plates and thin-walled shells of a linear elastic material in problem solving in practice, - calculate stress and deformation in such structural elements, - perform and analyse experiments with related structural elements, - analyse related problems from practice and perform problem solving methodically.

Contents

Minimum potential energy theorem. Castigliano’s theorems. Virtual work. In-plane loaded plates. Basic equations and Airy’s stress function. Inverse solutions for whole-plane and half-plane plates. Transversally loaded plates. Basic equations in cartesian coordinates. The Kirchhoff plate equation. Rectangular plates and boundary conditions. Fourier’s method of solution. Numerical solutions. The method of Rayleigh and Ritz’. Circular plates. Basic equations and boundary conditions. Standard solutions. Shells. Basic equations. The membran state of shells. Shells of circular symmetry and circular symmetric loading. The differential equation of bending of cylindrical shells, its solution and boundary conditions. Cylindrical pressure vessels with plane and spherical ends.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
There are lectures, exercises, a case study and a laboratory exercise. The theoretical part is dealt with in the lectures and the practical application through examples in the exercises and a case study (a numerical computerised exercise). In the laboratory exercise the bending of plates is studied analytically, experimentally and numerically.

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.
At the end of the course there is a written examination. The case study and the laboratory exercise shall be reported in written form.

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.

Overlap

The course M7005T is equal to MTM127

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	1.5	Mandatory	S07	
0003	Comulsory assignments	U G#	1	Mandatory	S07	
0004	Written exam	G U 3 4 5	5	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 Niklas Lehto, Programme Director 2022-02-14

Syllabus established

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