

SYLLABUS

Fracture mechanics and fatigue 7.5 credits M7012T

Brottmekanik och utmattning

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2022-01-14**

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Brottmekanik och utmattning

Second cycle, M7012T

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

Entry requirements

Basic course in strength of materials and solid mechanics or in continuum mechanics.

Selection

The selection is based on 30-285 credits

Course Aim

Divided into three categories below, the student after the course will be able to show:

1. Knowledge and understanding

- explain basic theories of fracture mechanics and fatigue,
- explain the underlying theories to the methods used in dimensioning,
- explain the mechanisms of crack propagation,
- explain the mechanisms of fatigue,

2. Skills and abilities

- ability to dimension steel structures against breakage and fatigue,
- ability to analyze the risk of breakdown and fatigue,
- plan and perform fatigue testing and analysis,
- analyze the causes of accident,
- communicate the results obtained in both written and oral form,
- perform fracture mechanical analysis and dimensioning with the help of manuals of simple fracture problems in linear and non-linear materials,

3. Ability of assessment and attitude

- assess the causes of the accident,
- evaluate how fracture mechanics and fatigue affect people, the environment and safety,
- reflect the role of dimensioning in sustainable development,
- explain today's challenges in fracture mechanics and fatigue,

Contents

The course covers basic theories of fracture mechanics and fatigue. Dimensioning of structures in a systematic way, using rules of fracture mechanics and fatigue is an important part. Fundamentals in fracture mechanical testing and fatigue are covered. Basic understanding and knowledge of mechanics, physics and mathematics are important tools. Course be divided into two parts below:

1. Fracture Mechanics

- Tensile testing, Impact testing and Fracture mechanics testing
- Linear fracture mechanics, fracture mechanics testing, Non-linear fracture mechanics
- J-integral
- Fatigue Crack Growth
- Fracture in structural steel
- Swedish and European Standard

2. Fatigue

- Welds
- Design
- Deformation controlled fatigue
- Swedish and European standard

This course provides an important basis from which to study and work in areas where mechanical components and systems are included, such as engineering design, product innovation, engineering, product development and so on.

Realization

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

The theoretical part is dealt with in the lectures and the practical application through examples in the exercises. In a compulsory laborative exercise the student tests and evaluates a component designed with respect to fracture failure.

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. Approved laboratory work and at the end of the course there is a written examination.

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.

Transition terms

2113

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	A07	
0003	Written exam	G U 3 4 5	6.5	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 2022-01-14

Syllabus established

by Department of Applied Physics and Mechanical Engineering 2007-02-28