

**SYLLABUS**

# **Mechanics and Experimental Methods 7.5 credits F0060T**

**Mekanik och experimentella metoder**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2023-02-15**

# Mechanics and Experimental Methods 7.5 credits F0060T

## Mekanik och experimentella metoder

### First cycle, F0060T

**Education level**

First cycle

**Grade scale**

G U 3 4 5

**Subject**

Fysik

**Subject group (SCB)**

Physics

## 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 +

Swedish upper secondary school courses Physics 2, Chemistry 1, Mathematics 3c or Mathematics D.

## Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

## Course Aim

After completing the course, you will have gained the knowledge, abilities and attitude described below.

### 1. Knowledge and understanding

- you can recognize physics as an experimental science, aimed at the observation of phenomena and at their rationalization;
- you can describe, explain and process the physical quantities pertaining to mechanics (forces, torques, work, energy, linear and angular momenta);
- you master scientific method to experimentally correlate the aforementioned physical quantities to one another, using methods like dimensional analysis, linearization, tables, graphics;
- you can describe and analyse physical systems by using the basic concepts of 2-dimensional mechanics, i.e. statics and dynamics, and correlate them with each other

### 2. Skills and abilities

- you can construct free-body diagrams, analyze and calculate forces and torques of two-dimensional rigid bodies at rest and in equilibrium;
- you can use Newton's laws to formulate, describe and solve mechanical problems involving particle and rigid body motion in two dimensions, i.e. kinematics and kinetics;
- you can apply the Newton's laws to describe the motion of simple and composite systems that are translating and rotating;
- you can apply the conditions of equilibrium to solve problems in statics, including engineering applications;
- you can apply the principles of mechanical energy to systems with rotating parts;
- you can plan, implement and evaluate the outcomes of experimental measures, determining the relationships with mathematical model;
- you can write a technical report presenting the results of an experimental activity and critically discussing them.

### 3. Assessment and attitude

- you can evaluate if results and calculations are reasonable;
- you can use the scientific method and develop a toolbox of several technical/engineering applications;
- you are aware of your own responsibility for developing sustainable technical solution
- you have a basis to progress in your studies in engineering and natural sciences.

## Contents

- Experimental methods: i. e. planning a scientific experiment, carrying out experimental work, analysis of experimental data, scientific writing (report about the experimental work)
- Kinematics
- Forces, torques/moments and systems of forces
- Equilibrium for simple and composite mechanical systems and applications such as for structures, frames and trusses
- Friction with applications in statics and dynamics
- Newton's laws and applications
- Work and energy, conservative forces
- Momentum and collisions
- Periodic motion
- Movement of center of mass
- Inertia and angular momentum
- Kinetics and kinematics of rigid bodies (translation and rotation)
- Applications

## 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 is given in form of lectures and compulsory laboratory work. The lectures contain overview of theory, demonstrations and problem solving.

## 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 will be performed as it follows (see also the Table below for a summary):

- final written exam (problem solving)
- approved laboratory course and written reports

## 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 included in a study program in combination with courses F0004T, F0006T or W0012T.

## Overlap

The course F0060T is equal to F0004T, F0006T, W0012T

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0007	Written exam	G U 3 4 5	4.5	Mandatory	A23	
0008	Laboratory work in classical mechanics	U G#	1.5	Mandatory	A23	
0009	Laboratory work in experimental methods	U G#	1.5	Mandatory	A23	

## 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, Head of Undergraduate Education 2023-02-15

## Syllabus established

by Niklas Lehto 2019-02-15