



Faculty of Health, Science and Technology  
Physics

## Syllabus

### Mechanics with applications 2

<b>Course Code:</b>	FYGA27
<b>Course Title:</b>	Mechanics with applications 2 <i>Mekanik med tillämpningar 2</i>
<b>Credits:</b>	7.5
<b>Degree Level:</b>	Undergraduate level
<b>Progressive Specialisation:</b>	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

#### Major Field of Study:

FYA (Physics)  
MTA (Mechanical Engineering)  
TKA (Engineering Physics)

#### Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2018-02-08, and is valid from the Autumn semester 2018 at Karlstad University.

#### Prerequisites

Foundation course in Mathematics 7.5 ECTS cr and Calculus and Geometry 7.5 ECTS cr completed. Attended courses Linear Algebra 7.5 ECTS cr, Calculus in Several Variables 7.5 ECTS cr and Mechanics with Applications 1, 7.5 ECTS cr., or equivalent.

#### Learning Outcomes

Upon completion of the course, students should be able to:

- give an account of basic concepts in mechanics and their relevance to different physical contexts,
- apply mathematical modelling of different relevant mechanical systems and their technical applications to calculate the quantities of systems based on the formulated model,
- give an account of Newton's laws and derivations from these laws and apply these to the analysis of equilibrium problems of rigid bodies and systems of rigid bodies,
- apply Newton's laws and derivations from these laws to movements of particles, particle systems and rigid bodies,
- give an account of the concepts and calculate work, energy, momentum, angular momentum for particles, particle systems, rigid bodies and systems of rigid bodies.

#### Content

Instruction is in the form of lectures and calculation exercises including experimental components.

Coordinate systems: normal and tangential coordinates

Moment of inertia for individual rigid bodies and systems of rigid bodies. Analysis of absolute and relative motion, kinematic constraints.

Particles and rigid bodies dynamics: translational motion, rotation of rigid body around fix axis, general plane motion of a rigid body, work, energy, momentum, impulse, angular momentum, impulse momentum, conservation laws, three-dimensional motion.

Among applications are body motion in relation to inelastic collision; non-conservative mechanical systems motion; reciprocal interaction of mechanical elements.

### **Reading List**

See separate document.

### **Examination**

Assessment is based on a written exam.

### **Grades**

One of the grades U (Fail), 3 (Pass), 4 (Pass with some distinction) or 5 (Pass with distinction) is awarded in the examination of the course to engineering students. One of the grades Fail (U), Pass (G) or Distinction (VG) is awarded to non-engineering students.

### **Quality Assurance**

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

### **Course Certificate**

A course certificate will be provided upon request.

### **Additional information**

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.