

**SYLLABUS**

# **Introduction to space mechanics and electronics 7.5 credits R0008R**

**Introduktion till rymdmekanik och elektronik**

**Course syllabus admitted: Autumn 2018 Sp 1 - Present**

**DECISION DATE  
2018-06-18**

# Introduction to space mechanics and electronics 7.5 credits R0008R

## Introduktion till rymdmekanik och elektronik

### First cycle, R0008R

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	U G#	Rymdteknik	Space Technology

### Main field of study

Space Technology

## 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 The applicant shall have competence equivalent to the degree from a basic engineering program or a Bachelor's degree with a minimum of 180 ECTS in the areas of space technology, aerospace, aeronautics, mechatronics, space physics, physics, electronics, mechanics, computer science or equivalent.

Previous course work at university level must include electronics or mechanics, and a minimum of 22.5 ECTS in mathematics at university level is required. Documented skills in English language.

## Selection

The selection is based on 1-165 credits.

## Examiner

Johnny Ejemalm

## Course Aim

This course will provide students with a prior knowledge of electronics and / or mechanics skills for further studies in the aerospace engineering field. Specifically, the course will provide knowledge of basic electronics and mechanics with applications in space applications.

## Contents

The course covers basic mechanics and electronics with a focus on its applications in space applications. The course contains two blocks, one in each area .

Electronics :

- Basic component knowledge and constitutive relations
- Ideal operational amplifier and its applications
- Current , voltage sources and equivalent circuits
- Analysis of steady-state DC and AC powered circuits.
- Kirchhoff's current and voltage laws
- Node and loop analysis method
- Complex method (  $j\Omega$  )
- Power calculations

Mechanics :

- Newton's laws
- Work and energy, conservative forces
- Linear and angular momentum
- Rigid body motion
- Gravitational law
- Kinematics and kinetics
- Kepler's laws
- Classical orbital elements
- Reference systems
- Elliptic, parabolic, and hyperbolic orbit
- Transfer orbits

## Realization

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

Lectures, laborations, and tutorials.

## 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. Hand-In problems and compulsory laborations.

## Literature. Valid from Autumn 2018 Sp 1

W.H. Hayt, J.E. Kemmerly, and S.M. Durbin  
Engineering Circuit Analysis  
ISBN 978-0-07-352957-8

Adel Sedra & Kenneth Smith, e.g.  
Microelectronic circuits 5th edition

Howard D. Curtis,  
Orbital Mechanics for Engineering Students,  
ISBN 978-0-08-097747-8

## Course offered by

Department of Computer Science, Electrical and Space Engineering

## Items/credits

Number	Type	Credits	Grade
0001	Hand-In problems	3.8	TG U G#
0002	Laboratory work	3.7	TG U G#

## 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 Jonny Johansson, HUL SRT 2018-06-18

## Syllabus established

by Jonny Johansson, HUL SRT 2014-02-14