

COURSE CATALOGUE OFFER

Academic year: 2020/2021

General Courses

Language of instruction: English



Index	Name of the course	Number of hours	ECTS	Number of hours acc. to the form of classes			
				lectures	exercises	laboratories	project
Core Module							
1.	<i>Physics I (I st cycle)</i>	60	4	15	30	15	
2.	<i>Engineering mechanics</i>	45	3	15	30		
3.	<i>Introduction to electrical engineering and electronics</i>	35	2	10	10	15	
4.	<i>Thermodynamics</i>	45	3	15	30		
5.	<i>Elements of space physics</i>	30	2	10	20		
6.	<i>Physics II (II nd cycle)</i>	30	2	5	20	5	
7.	<i>Statistical analysis and data mining in engineering</i>	30	2	10	20		
Total	ECTS		18				

Description of the modules:**1. Physics I****Educational content:**

Aim of the course is to give to the student the overview of general Physics. During the course the student will learn about Mechanics, Optics, Electromagnetism, Electricity and their application in the physics of the plain. This course uses rich multimedia tutorials to present the material: film clips of key experiments, animations and worked example problems. Student will then do a range of interesting problems to practice what he/she has learnt. Student will have possibility to do his/herself physical experiments in the laboratory.

Effects of education – Abilities and competences:

Student will be prepared to analyze and understand the technical issues, which are based on the phenomena and laws of physics.

2. Engineering Mechanics**Educational content:**

Aim of the course is to give to the student the overview of Engineering Mechanics. During the course the student will learn about Statics (study of body at rest), Kinematics (study of body in motion) and Dynamics (study of forces and torques and their effect on motion). The course is focused on the understanding and applying the laws of physics in the technology. This course uses rich multimedia tutorials to present the material: film clips of key.

Effects of education – Abilities and competences:

Student will be prepared to analyze and understand the technical issues, which are based on the phenomena and laws of physics. He/She will understand with greater depth many of the wonders around his/herself in everyday life and in technology. Students should then be able to recognize problems of this sort in real-world situations and respond accordingly.

3. Introduction to Electrical Engineering and Electronic**Educational content:**

Aim of the course is to give to the student the Introduction to electrical engineering. The course starts with a review of basic physical principles (electromagnetisms, current, law of Gauss), and expands into a detailed description of the electronic devices. Student will measure the basic parameters of the electronic devices as well as electrical circuit.

Effects of education – Abilities and competences:

Student will be prepared to analyze and understand the technical issues, use electronic devices, as well as know how to read electronic scheme.

4. Thermodynamics**Educational content:**

Aim of the course is learn the students how to characterize the energy state of a system and the mechanisms for transferring energy from one system to another. These are the tools necessary to understand stationary and transportation power systems from small scale, like batteries, to large scale, like nuclear power plants.

Effects of education – Abilities and competences:

Student will be prepared to analyze and understand the technical issues, which are based on the phenomena and laws of thermodynamics.

5. Elements of Space Physics

Educational content:

International space physics projects. Space physics studies in US and European Universities. Cosmic and geophysical data centers.

Basic physics of the space environment: basic plasma physics - orbit theory, MHD and kinetic theory, particle acceleration theory, plasma waves and radiation, physical condition in space. Solar physics: X-ray corona, particle acceleration, solar activity, solar wind, variations with heliocentric distance and heliolatitude, shock waves, radio bursts, solar observatories on the Earth and on the orbit. Ulysses mission.

Earth's and planetary magnetospheres, geomagnetic storms, radiation belts, auroral displays. Galactic and solar cosmic rays.

Earth's atmosphere, ionosphere, propagation of electromagnetic waves. Solar and cosmic ray influences on climate.

Outer heliosphere, termination shock, Voyager and Proton missions.

Radiation in space. Space weather and radiation damage on living organisms and apparatus. Space Debris.

Effects of education – Abilities and competences:

By the end of the course students should be familiar with and able to describe or use all the concepts and phenomena listed in the syllabus. The written course notes, syllabus, and any additional material presented in class constitute the examinable material of the course.

6. Physics II

Educational content:

Aim of the course is to give to the student the overview of the modern (mainly quantum) physics. During the course the student will learn about the quantum mechanics as well as their application in the real life. We will deep discuss the importance of the modern technologies and devices for example: semiconducting materials, lasers in the army. This course uses rich multimedia tutorials to present the material: film clips of key experiments, animations and worked example problems. Student will then do a range of interesting problems to practice what he/she has learnt. Student will have possibility to do his/herself physical experiments in the laboratory.

Effects of education – Abilities and competences:

Student will be prepared to analyze and understand the technical issues, which are based on the phenomena and laws of physics.

7. Statistical analysis and data mining in engineering

Educational content:

Aim of the course is to give to the student the overview of the data modelling used in the engineering analysis. During the course the student will learn about the statistical models as well as their application to the engineering. We will deep discuss the importance of the models to exploration of data for example to calculate of the reliability of the aircraft. This course uses rich examples to present the material: as well as tutorials to solve particular problems. Student will calculate the models and have conduct their own project.

Effects of education – Abilities and competences:

Student will be prepared to analyse and understand the technical issues, which are based on the statistical analysis.