RĪGAS TEHNISKĀ UNIVERSITĀTE

RTU Course "Physics"

14506 null

General data

Code	MFA101
Course title	Physics
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Andris Ozols
Academic staff	Juris Blūms Ilze Klincāre Aleksandrs Mičko Anželika Blūma Armands Grickus Silvija Lukse Vladimirs Miglāns Igors Bužs Dmitrijs Ļitvinovs Ainārs Knoks Igors Klemenoks
Volume of the course: parts and credits points	2 parts, 6.0 Credit Points, 9.0 ECTS credits
Language of instruction	LV, EN
Annotation	The study course is intended for students of engineering study programmes and is following a high-school physics and includes description of physical processes using elements of higher mathematics. The study course consists of lectures with practical examples and laboratory work. The study course provides the theoretical basic knowledge of mechanics, molecular physics and thermodynamics, electromagnetism, wave and quantum optics, quantum mechanics, solid state physics, atomic, nuclear and particle physics. In the frame of the study course practical skills of problem solving methods as well as experimental work are acquired.
Goals and objectives of the course in terms of competences and skills	The goal of the study course is to master the theoretical knowledge and practical skills in physics at university level using methods of higher mathematics. The objectives of the study course: to develop physical and technical perception and logical thinking; to gain an understanding of physics and its latest achievements; to develop the ability of students to apply physics for solution of various technical problems, including high technology.
Structure and tasks of independent studies	Independent study of textbooks and solution of the practical exercises. The preparation of the theoretical introduction for each laboratory work, the mathematical processing of the laboratory work and concluding reports preparation.
Recommended literature	Obligātā/Obligatory: 1. Fizika. Red. A. Valters. Rīga: Zvaigzne, 1992. 643 lpp. 2. Fizikas praktikums tehniskās universitātes studentiem. M. Jansone, I. Klincāre, A. Ķiploka u.c. Rīga: RTU, 2003, 172 lpp. 3. Uzdevumu krājums vispārīgajā fizikā. Red. A.Ozols. Rīga: RTU, 2006, 273.lpp. Papildu/Additional: 1. Apinis, A. Fizika. Rīga: Zvaigzne, 1972. 706 lpp. 2. Grabovskis, R. Fizika. Rīga: Zvaigzne, 1983. 645 lpp. 3. Hugh D. Young, Roger A. Freedman, A.Lewis Ford, Katarzina Zuleta Estrugo. University Physics with Modern Physics. Pearson Education Limited, Harlow, United Kingdom, 2020, 1513 p. 4. Halliday, D., Resnick, R., Walker, J. Fundamental of physics. 11th ed., John Wiley & Sons, NY,Chichester, etc., 2018, 1456 p. 5. Giancoli, D.C.. Physics for Scientists & Engineers with Modern Physics. 5th ed., Prentice Hall, International, Inc., 2021. 6. Volkenšteine, V. Uzdevumu krājums fizikā. Rīga: Zvaigzne, 1968. 353 lpp. 7. Fizikas uzdevumu risināšana. Red. A.Valters. Rīga: Zvaigzne, 1982. 175 lpp. 8. Novērojumu un mērījumu rezultātu matemātiskās apstrādes pamati: metodiski norādījumi laboratorijas darbu veikšanai. Sast. A.Valters, N. Zagorska. Rīga: RTU, 1991. 25 lpp. 9. Uzdevumu krājums vispārīgajā fizikā. M. Jansone, A. Kalnača, J. Blūms u.c. Rīga: RTU, 2000, 247 lpp. 10. Fizikas praktikums tehniskās universitātes studentiem. I. Klincāre, M. Jansone, A. Ķiploka u.c. Rīga: RTU, 2001,189 lpp.
Course prerequisites	Physics, chemistry and mathematics in high school level course, elements of higher mathematics.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Principles of mechanical motion.	10	12	6	28
Molecular physics and thermodynamics.	6	7	3	16
Electricity and magnetism.	19	28	9	40
Wave optics.	9	13	5	26

Quantum nature of electromagnetic radiation.	4	4	2	12
Quantum mechanics and fundamentals of atomic physics.	6	8	3	16
Fundamentals of solid state physics.	4	4	2	12
Fundamentals of nuclear and elementary particle physics.	4	4	2	12
Test (theory).	2	0	0	0
Test (practical problems).	4	0	0	0
Laboratory work.	28	40	16	30
Control of laboratory work records.	24	0	0	0
Total:	120	120	48	192

Learning outcomes and assessment

Learning outcomes	Assessment methods
Able to navigate the physics topics and issues within the scope of the course, as well as the latest achievements of physics.	Test types: tests, home works, written exam. Criterion: able to freely navigate different types of physical regularities.
Able to independently solve the standard problems of classical physics using the knowledge of higher mathematics.	Test types: tests, home works, written exam. Criterion: able to take on specific numerical calculations.
Able to independently carry out physics experiments, and to do the mathematical processing of the obtained results.	Test types: test lab works. Criterion: ability to process and quantitatively analyse the experimental results.
Able to discern the laws of physics in different engineering applications, and their implementation in nature and everyday life.	Test types: tests, home works, written exam. Criterion: able to explain the physics related to natural phenomena and engineering principles of the physical operation of devices.

Evaluation criteria of study results

Criterion	%
Laboratory works	25
Tests	20
Exams	50
Home works	5
Total:	100

Study subject structure

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	2.0	0.0	1.0		*	
2.	3.0	2.0	0.0	1.0		*	