

## RTU Course "Electricity and Magnetism"

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**General data**

Code	RRE102
Course title	Electricity and Magnetism
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Dmitrijs Pikuļins
Academic staff	Ivars Dūmiņš Vladimirs Miglāns
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, EN
Annotation	In the study course students are introduced to the concepts of scalar and vector quantities and fields, electric and magnetic fields in empty space and space with matter. Special attention is paid to the basic laws of electrical and magnetic circuits, time-varying electromagnetic fields and waves. The acquired knowledge allows students to orientate in electrical, magnetic and electromagnetic phenomena, giving an idea of the practical applications of observed phenomena.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to provide theoretical knowledge and practical skills for recognizing, observing and explaining electrical and magnetic phenomena. Tasks of the study course: to acquaint students with static, quasi-static and variable electric and magnetic fields and their properties; to develop students' skills to use the findings of electromagnetic field theory for low current applications; to promote understanding of the fundamental phenomena of electricity and magnetism used in modern technologies.
Structure and tasks of independent studies	Students independently perform the analysis of the study literature, prepare the theoretical substantiation for laboratory work, process and analyze the results.
Recommended literature	Obligātā/Obligatory: 1. Elektriķa un magnētisms. Laboratorijas praktikums. 1. daļa. Rīga: RTU, 2005. 20 lpp. 2. Elektriķa un magnētisms. Laboratorijas praktikums. 2. daļa. Rīga: RTU, 2007. 56 lpp. 3. Cutnell, John D., and Kenneth W. Johnson. Physics. 9th edition. 2012. Physics. New York: J. Wiley. 4. Fizika. A. Valtera red. Rīga: Zvaigzne, 1992. 735 lpp. Papildu/Additional: 1. Apinis, A. Fizika. Rīga: Zinātne, 1972. 708 lpp. 2. Grabovskis, R. Fizika. Rīga: Zvaigzne, 1968. 3. Трофимова, Т.И. Курс физики. Москва: Высшая школа, 1990. 4. Савельев, И.В. Курс общей физики. Т.2. 1982.
Course prerequisites	Mathematics, fundamentals of materials science.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
The essence of the field, its characteristics	2	2	0	0
Scalar and vector magnitudes, fields	2	2	0	0
Characteristics of the vector field	2	2	0	0
Electric and magnetic fields	4	4	0	0
Field components	2	2	0	0
Polarisation and magnetisation	2	2	0	0
Electric circuits	4	4	0	0
Magnetic circuits	4	4	0	0
Electromagnetic induction	4	4	0	0
Alternating current, its effects	4	4	0	0
Components of the alternating current	4	4	0	0
Electromagnetic field	4	4	0	0
Electromagnetic waves	2	2	0	0
<b>Total:</b>	<b>40</b>	<b>40</b>	<b>0</b>	<b>0</b>

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
Able to navigate in the electricity and magnetism phenomena.	Laboratory works, homework, exam.
Able to explain electromagnetic effects in low current circuits and apply appropriate relationships to circuits.	Laboratory works, homework, exam.
Able to independently perform experiments and process results.	Laboratory works

Able to perform calculations of electrical and magnetic circuit parameters.	Laboratory works, homework, exam.
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***Evaluation criteria of study results***

Criterion	%
Laboratory works	40
Exam	50
Homework	10
Total:	100

***Study subject structure***

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	1.5	0.0	0.5		*	