RTU Course "PCB Design"

33000 Faculty of Computer Science, Information Technology and Energy

General data

Code	REA307
Course title	PCB Design
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Dmitrijs Pikuļins
Academic staff	Juris Grizāns
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	PCB design fundamentals: technology, constructions, EMC. CAD, EDA design tools, software. Altium Designer, CADSTAR etc. and their structure: design explorer, navigation, existing menus and toolbars, locating component and loading libraries, creating schematic sheet, components placement, manual and automatic routing , design rule check, board design verifying. Creating output files. Practical design.
Goals and objectives of the course in terms of competences and skills	The goals of the course is to acquire knowledge about the board-level design by means of CAD and to develop practical skills necessary for PCB design. Results and competences: elaborated study project in accordance with technical task; ability to work in CAD environment and to use graphical editors; ability to create libraries of components; ability to set up design options, to locate components and to load libraries; ability to document the project; ability to design PCB manually and by means of interactive options; ability to discuss the project and to defend it
Structure and tasks of independent studies	Fundamentals of computers
Recommended literature	1. Clyde Coombds, Happy Holden. Printed Circuits Handbook, Seventh Edition 7th Edition, McGraw-Hill Education; 7 edition (March 9, 2016). 1648 p. 2. Roger Hu. PCB Design and Layout Fundamentals for EMC. Independently published (July 22, 2019). 163 p. 3. Douglas Brooks PCB Currents: How They Flow, How They React (Paperback) 1st Edition. Prentice Hall; 1 edition (December 1, 2017). 348 p. 4. Brendon Parise. A Practical Guide to RF and Mixed Technology Printed Circuit Board Layout. Independently published (October 16, 2017). 207 pg. 5. Simon Monk, Duncan Amos . Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards 2nd Edition. McGraw-Hill Education TAB; 2 edition (July 10, 2017), 352.p. 6. Медведев А. Печатные платы. Конструкции и материалы. М.: Техносфера, 2005. 304 с. 7. Уваров А.С. Автотрассировщики печатных плат. М.: ДМК пресс, 2006. 288 с. 8. Сабунин А.Е. ALTIUM Designer.Новые решения в проектировании электронных устройств. М.: Солон-Пресс, 2009. 432 с. 9. Суходольский В.Ю. ALTIUM Designer. Проектирование функциональных РЭС на печатных платах. СПб.: БХВ-Петербург, 2010. 480 с.
Course prerequisites	RTR105 Computer Studies (basic course)

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Design methodology of electronic units, optimization, design criterion. Objectives & tasks of course	2	3	0	0
Fundamentals of PCB design	2	3	0	0
Computer Aided Design -CAD and Electronic Design Automation (EDA)	4	6	0	0
Printed Circuit Board (PCB) CAD	4	6	0	0
PCB Manufacturing	2	3	0	0
CAD development	2	3	0	0
PStudies: Introductory CAD demonstration (PCAD, CADSTAR,AltiumDesigner,PROTEL etc.)	2	3	0	0
PS: Starting CAD. PCB design base steps & results	2	3	0	0
PS: CAD Schematic Editor user interface.	2	3	0	0
PS: Locating schematic component and loading libraries	2	3	0	0
PS: Creating component libraries	4	6	0	0
PS: Creating PCB component footprint library	4	6	0	0
PS: Schematic Editor - wiring the circuit up	2	3	0	0
PS: Transferring the design. Setting up workspace and component placement	2	3	0	0

PS: Manual and interactive routing the board. Verifying board design (setup DRC)	4	6	0	0
PS: Automatical routing the board. Setting up design rules and strategy	4	6	0	0
PS: Setting up the project outputs	2	3	0	0
PS: Completing design and result analysis	2	3	0	0
Total:	48	72	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Ability to locate & create PCB components and load the libraries	practical studies, home work - discussion
Ability to add schematic sheets to a project	practical studies, home work - discussion
Ability to set up the PCB workspace and place components on the PCB	practical studies, home work -discussion
Ability to route the PCB	practical studies, home work -discussion
Ability to design PCB, to discuss and defend the work	studies work - defence

Evaluation criteria of study results

Criterion	%
Practical work	20
Homework	30
Course work	50
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	1.0	0.0	2.0			*