

## Specification for the book of courses

<b>Study program</b>		Electrical Engineering and Computer Science		
<b>Module</b>		Electron Devices and Microsystems		
<b>Type and level of studies</b>		Undergraduate Academic Studies		
<b>The name of the course</b>		Printed Circuit Boards Design		
<b>Lecturer (for lectures)</b>		Prijjić D. Zoran, Danković M. Danijel		
<b>Lecturer/associate (for exercises)</b>		Stojković S. Aleksandra		
<b>Lecturer/associate (for OFE)</b>		Marjanović B. Miloš		
<b>Number of ECTS</b>		5	<b>Course status (obligatory/elective)</b>	Obligatory
<b>Prerequisites</b>				
Learning objectives are defined so that the student will:				
<ul style="list-style-type: none"> <li>- Know the process of designing printed boards and to apply it in practice;</li> <li>- Know the process of designing an electronic device as a whole;</li> <li>- Be able to use software packages for electrical (ECAD) and mechanical (MCAD) design;</li> <li>- Understand the principle of ECAD-MCAD Collaboration and basic concept of Product Data Management (PDM);</li> <li>- Have the knowledge and confidence to analyze and improve existing ones, as well as to create new projects;</li> <li>- Adopt a behavioral pattern necessary for productive teamwork.</li> </ul>				
<b>Course objectives</b>				
Learning outcomes are defined so that the student will:				
<ul style="list-style-type: none"> <li>- Distinguish between different types of printedcircuit boards, elements of their structure and technology of their production;</li> <li>- Explain the procedure and phases of designing electronic product collaboratively using ECAD and MCAD packages;</li> <li>- Formulate the functional, electrical and mechanical specifications of the product and break it at the block / logic level;</li> <li>- Design and examine electrical schematic, using ECAD package;</li> <li>- Construct electro-mechanical parts and sub-assemblies, using MCAD package;</li> <li>- Design a printed circuit board, using ECAD package;</li> <li>- Compile and check the whole device assembly, using ECAD and MCAD package;</li> <li>- Create project and production documentation, using ECAD and MCAD packages;</li> <li>- Propose product versions with enhanced / expanded specifications, as a member of the project team;</li> </ul>				
<b>Course outcomes</b>				
<b>Course outline</b>				
Technology of printed circuit board production. SMD assembly technology components. Single and double sided boards. Electromechanical design. Software packages for electrical and mechanical design. 3D modeling of components, printed boards and enclosures. Design rules. Layout of the components on the board. Model exchange between ECAD and MCAD package. Design for production. Introduction to the product data management and collaborative design. More details in: D. Danković, Lj. Vračar, A. Prijjić, Z. Prijjić, „An Electromechanical Approach to a Printed Circuit Board Design Course“, IEEE Trans. Education, Vol. 56, No. 4, pp. 470-477, 2013.				
<b>Theoretical teaching</b>				
Use of ECAD and MCAD packages. Electromechanical design and practical realization of device models (electrical schematic, printed circuit board, connectors, harnessing, housing, technical documentation).				
<b>Practical teaching (exercises, OFE, study and research)</b>				
<b>Textbooks/references</b>				
1	Application notes of electronic devices' manufacturers			
2	C. Combs and H. Holden, "Printed Circuits Handbook", 7th ed., McGraw-Hill Education, 2016.			
3	C. Robertson, "Printed Circuit Board Designer's Reference: Basics", Prentice Hall, 2003.			
4	Built-in help systems of ECAD and MCAD pacakages			
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	2	1	0	0

<b>Teaching methods</b>	Project teaching - entire content is practically applied to the project of an electronic apparatus (device). The device is conceived as a generic, so it is a basis that can be modified, enhanced, and expanded, on which the content of student activities is based. Exercises on the computer; Exercises in the laboratory; Consultations.		
<b>Grade (maximum number of points 100)</b>			
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	10	Written exam	25
Exercises	40	Oral exam	25
Colloquia			
Projects			