Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Electron Devices and Microsystems		
Type and level of studies	Undergraduate Academic Studies		
The name of the course	Renewable Energy		
Lecturer (for lectures)	Pantić S. Dragan, Mančić D. Dragan, Aleksić M. Sanja		
Lecturer/associate (for exercises)	Aleksić M. Sanja, Jovanović D. Igor		
Lecturer/associate (for OFE)	Aleksić M. Sanja, Jovanović D. Igor		
Number of ECTS	5	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	Acquiring knowledge in the field of renewable energy sources. Getting to know about different types of renewable energy sources. Learning and studying characteristics of components and systems used in the processes of conversion of renewable energy sources into electrical and thermal energy. Mastering the techniques of measuring the basic characteristics of the components and systems and familiarizing with the software tools used to design these systems. Training for practical work in the field of renewable energy sources.		
Course outcomes	The course is organized in such a way that students, upon combining the acquired theoretical and practical knowledge and skills, are able to design and design systems for obtaining electricity and heat from renewable energy sources.		
Course outline			
Theoretical teaching	Getting acquainted with the contents of the course, teachers, associates, the necessary literature and the way of passing the exam. Energy and environment, global energy needs. Production, supply and use of energy. Global warming, climate change, carbon dioxide emissions. Types of renewable and non-renewable energy sources. Overview of the situation in the world, the European Union and Serbia. Solar thermal energy. Types and characteristics of solar thermal collectors. Types of solar thermal systems. Solar photovoltaic energy. Types of solar cells and their electrical characteristics. Types of photovoltaic systems. Wind energy, basic parameters of air flow. Basics and types of wind turbines. Turbine power curve. Parts of the system. Environmental and economic parameters. Hydroenergy - resources, power of water, estimation of available energy, types of turbines and systems. Small hydropower plants - types and constructions. Biomass energy: characteristics, technologies and systems for the use of biomass. Dedicated biomass production. Biochemical processes of production (ethanol, biodiesel, biogas). Fuel cells and hydrogen energy. Geothermal energy: types of geothermal resources, resources, technologies and systems for exploitation. Nuclear energy: the processes of obtaining nuclear energy, nuclear fuel. Energy storage. Techno-economic analysis of renewable energy technologies and their applications. Legislation.		
Practical teaching (exercises, OFE, study and research	Design of solar thermal system. Testing the characteristics of the solar cell. Design, optimization and techno-economic analysis of the autonomous photovoltaic system. Modeling wind turbines. Determination of wind turbine characteristics depending on wind speed change. Modeling the charging and discharging process of the battery.		
Textbooks/references			
1	Fundamentals of Renewable Energy Processes, Aldo V. Da Rosa, Elsevier Inc. 2009.		
2	Renewable Energy, Bent Sørensen, Elsevier Academic Press, 2004.		
3	Renewable Energy, Boyle G., editor, Oxford University Press, 2004.		
4	Lectures and exercises (http://mikro.elfak.ni.ac.rs/predmeti/obnovljivi-izvori-energije/)		
5			

Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	1	1	0	0

Teaching methods	Lectures, independent studio research work, computational exercises, laboratory exercises, consultations. Lectures are conducted in combination. The lectures present the theoretical part of the material, supported by characteristic examples for easier understanding of matter. Through student research work, a student studying available literature, doing a seminar work or a team project. Practical examples of budgeting and design of concrete systems are used in computational exercises. Practical knowledge is acquired in laboratory exercises.

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures	10	**Written exam**	20

Exercises		**Oral exam**	30
Colloquia			
Projects	40		