

Faculty of Metallurgy and Technology / ENVIRONMENTAL PROTECTION / ALTERNATIVE ENERGY SOURCES

Course:	ALTERNATIVE ENERGY SOURCES			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
12303	Mandatory	1	7	2+2+0
Programs	ENVIRONMENTAL PROTECTION			
Prerequisites	There are no conditions for registering and listening to the subject			
Aims	Introducing students to the possibilities and perspectives of new energy sources of non-fossil origin			
Learning outcomes	After the student passes this exam, he will be able to: - Defines the types and importance of renewable energy sources - Defines the types and importance of energy storage - Uses the legal regulation of renewable energy sources - Defines the energy potential and economy of application of certain renewable energy sources - Recognizes problems related to the application of certain technologies in existing energy systems -- Apply acquired knowledge in development and scientific research in the field of renewable energy sources - Apply acquired knowledge in development and scientific research in the field of energy storage			
Lecturer / Teaching assistant	Prof. Dr. Veselinka Grudić, Jana Mišurović, PhD			
Methodology	Lectures, exercises, seminar work. Consultations and colloquia			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introduction. Forms and sources of energy. Properties of renewable energy sources. Current state of use and problems of application of renewable energy sources			
I week exercises	Renewable energy sources in Montenegro - discussion			
II week lectures	Regulation of renewable energy sources. EU directive.			
II week exercises	Calculation exercises			
III week lectures	Solar energy sources. Solar collectors			
III week exercises	Calculation exercises			
IV week lectures	Photovoltaic cells, focusing solar energy.			
IV week exercises	Calculation exercises			
V week lectures	Wind energy. Wind power plants			
V week exercises	Calculation exercises			
VI week lectures	Biomass. Types and properties. Biomass energy production technology			
VI week exercises	first colloquium			
VII week lectures	Biogas, alcohol fuels and biodiesel			
VII week exercises	Remedial of first colloquium			
VIII week lectures	Hydropower			
VIII week exercises	Field exercises			
IX week lectures	Tidal and wave energy. Ocean thermal energy			
IX week exercises	Presentation of seminar papers			
X week lectures	Geothermal energy			
X week exercises	Presentation of seminar papers			
XI week lectures	Nuclear energy			
XI week exercises	Field exercises			
XII week lectures	General principles of energy storage. Hydrogen economy			
XII week exercises	Presentation of seminar papers			
XIII week lectures	Storage of electrical energy - batteries			

XIII week exercises		II colloquium				
XIV week lectures		Electric energy storage - supercapacitors				
XIV week exercises		Presentation of seminar papers				
XV week lectures		Electric energy storage - fuel cells				
XV week exercises		Remedial II colloquium				
Student workload		Weekly: 7 credits x 40/30=9 h 20 min Total workload for the semester = 7 x 30 = 210 hours.				
Per week			Per semester			
7 credits x 40/30=9 hours and 20 minuts 2 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises 5 hour(s) i 20 minuts of independent work, including consultations			Classes and final exam: 9 hour(s) i 20 minuts x 16 =149 hour(s) i 20 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 9 hour(s) i 20 minuts x 2 =18 hour(s) i 40 minuts Total workload for the subject: 7 x 30=210 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 42 hour(s) i 0 minuts Workload structure: 149 hour(s) i 20 minuts (courses), 18 hour(s) i 40 minuts (preparation), 42 hour(s) i 0 minuts (additional work)			
Student obligations			Obligations of the student during classes Students are obliged to attend classes, do a seminar paper and both colloquiums.			
Consultations			Consultations Depending on the lecture schedule			
Literature			1) J. Twidell, T. Weir, Renewable Energy Resources, Taylor & Francis, New York, 2006. 2) Lj. Majdandžić, Renewable energy sources, Graphis, Zagreb, 2008. 3) S. Tomovic, Alternative energy sources, Technical book, Belgrade, 2002. 4) M. Radakovic, Renewable energy sources and their economic assessment, AGM books, Belgrade 2010. 5) B. Brgur, Alternative energy sources: principles of conversion and storage, TMF Belgrade, 2015			
Examination methods			Forms of knowledge assessment and assessment: - Activity during class: (0 - 5 points), - Seminar work: (0 - 5 points) - I colloquium: (0 - 20 points), - II colloquium: (0 - 20 points), - Final exam: (0 - 50 points), A passing grade is obtained if at least 50 points are cumulatively collected			
Special remarks						
Comment						
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points