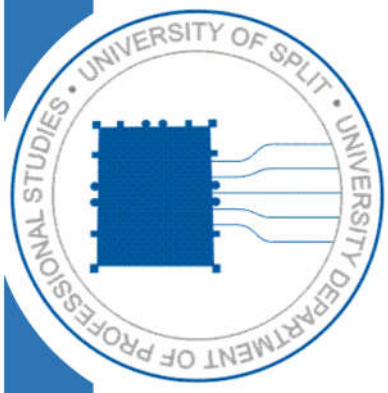
Course syllabus

Renewable Sources of Energy



COURSE DETAILS		
Type of study programme	Undergraduate professional study programme- 180 ECTS	
Study programme	MECHANICAL ENGINEERING	
Course title	Renewable Sources of Energy	
Course code	SKS033	
ECTS (Number of credits allocated)	5	
Course status	Elective	
Year of study	Third	
Course Web site	https://moodle.oss.unist.hr/course/category.php?id=21	
Total lesson hours per semester	Lectures	30
	Practicals	30
	Laboratory exercises & practical demonstration	0
Prerequisite(s)	None	
Lecturer(s)	Department of Mechanical Engineering: Zlatko Jankoski, Ph.D., Tenured College Professor	

COURSE DESCRIPTION	
Course Objectives:	- understanding basic characteristics of renewable sources of energy and technologies for their utilisation - to give review on utilisation trends of renewable sources of energy - to give review on legislative and regulatory rules related to utilisation of renewable sources of energy
Learning outcomes ***On successful completion of this course, student should be able to:***	1. define basic properties of different renewable sources of energy and technologies for their utilisation, 2. describe main elements of technical systems designed for utilisation of renewable sources of energy, 3. interpret advantages and disadvantages of different renewable sources of energy 4. undertake simple analysis of energy potential of renewable sources of energy, 5. explain the correlation between different operational parameters, 6. select engineering approach to problem solving when implementing the projects on renewable sources of
Course content	**Introduction:** Energy. Environment. Generation and consumption of energy. Emissions of carbon dioxide. Renewable sources of energy – review, technologies, and statistics. New technologies. **Solar Energy:** Basic properties of solar energy. Applications of solar energy. Transformation of solar energy. Solar heat collectors. Solar photovoltaic collectors. Application of solar collectors – examples. Solar power plant. Economics of solar collectors. Trends in solar energy utilisation. **Wind Energy:** Basic properties of wind energy. Applications of wind energy. Transformation of wind energy. Wind turbines. Operative characteristics of wind turbines. Wind power plant. Utilisation of wind power – examples. Economics of wind turbines. Trends in wind energy utilisation. **Hydropower:** Basic properties of water energy. Available energy of water flow. Transformation of water energy. Hydropower plants. Small hydropower plants. Special hydropower plants. Utilisation of hydropower – examples. Economics of hydropower. Trends in hydropower utilisation. **Hydrogen Energy:** Basic properties of hydrogen. Technologies of hydrogen production. Transformation of hydrogen energy – hydrogen economy. Fuel cells – operating principle, main parts, properties. Applications of hydrogen and fuel cells – examples. Economics of hydrogen. Trends in hydrogen utilisation. **Biomass Energy:** Types of biomass and their basic properties. Transformation of biomass energy. Applications of biomass. Technologies for utilisation of biomass – examples. Economics of biomass. Trends in biomass energy utilisation. **Geothermal Energy, Heat Pumps, Financial Models, Legislative Framework, Administrative Procedures.**

CONSTRUCTIVE ALIGNMENT – Learning outcomes, teaching and assessment methods

Alignment of students activities with learning outcomes		
Activity	**Student workload ECTS credits**	**Learning outcomes**
Lectures	30 hours / 1 ECTS	1,2,3,6
Practicals	30 hours / 1 ECTS	2,4,5,6
Seminar Thesis (preparation and delivery)	51 hours / 1,7 ECTS	1,2,3,4,5,6
Self-study	30 hours / 1 ECTS	1,2,3,4,5,6
Office hours and final exam	9 hours / 0,3 ECTS	1,2,3,4,5,6
TOTAL:	**150 hours / 5 ECTS**	**1,2,3,4,5,6**

CONTINUOUS ASSESSMENT		
Continuous testing indicators	**Performance A_i (%)**	**Grade ratio k_i (%)**
Attendance and activities during lectures	70-100	40
Attendance and activities during practicals	70-100	60

FINAL ASSESSMENT		
Testing indicators – final exam (first and second exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Seminar Thesis (written)	50 - 100	30
Seminar Thesis (oral)	50 - 100	30
Theoretical exam (oral)	50 - 100	30
Previous activities (include all continuous testing indicators)	70 - 100	10
Testing indicators – makeup exam (third and fourth exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Seminar Thesis (written)	50 - 100	30
Seminar Thesis (oral)	50 - 100	30
Theoretical exam (oral)	50 - 100	30
Previous activities (include all continuous testing indicators)	70 - 100	10

PERFORMANCE AND GRADE		
Percentage	**Criteria**	**Grade**
50% - 61%	*basic criteria met*	sufficient (2)
62% - 74%	*average performance with some errors*	good (3)
75% - 87%	*above average performance with minor*	very good (4)
88% - 100%	*outstanding performance*	outstanding (5)

ADDITIONAL INFORMATION

Teaching materials for students (scripts, exercise collections, examples of solved exercises), teaching record, detailed course syllabus, application of e-learning, current information and all other data are available by MOODLE system to all students.