Course Unit Descriptor

Study Programme: Environmental Engineering

Course Unit Title: Alternative energetics

Course Unit Code: ZN206

Name of Lecturer(s): Assistant Professor Jasmina Pekez

Type and Level of Studies: Bachelor academic degree

Course Status (compulsory/elective): Compulsory

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 6

Prerequisites: None

Course Aims:

Acquisition of knowledge and training students for further application and practical work in the field of alternative energetics in the domain of Renewable energy sources.

Learning Outcomes:

Ability to implement acquired knowledge in further education and future engineering practice in the domain of Renewable energy sources.

Syllabus:

Theory

Power engineering, economy and ecology (general part).
Solar energy: resources, solar technologies (photovoltaic (PV) technologies, solar heating technologies), solar systems (PV independent and economically interactive systems; distributed and central receiving systems), use of ocean thermal energy
Wind energy: resources, the use of wind energy, vertical and horizontal wind generators (VAWT, HAWT), Wind energy based systems (independent and interactive), technical problems and solutions.
Hydro energy: resources, the use of driving force of water, estimation of available energy, impulse and reaction turbines, hydro power plant as a part of PES, small hydro plants, the use of tides and waves.
Geothermal energy: types of geothermal sources, resources, technologies and systems for their exploitation (direct and indirect use), consequences on the environment.
Biomass: characteristics of biomass, technologies and systems for the use of biomass (combustion, gasification, pyrolysis), biofuel (biodiesel, biogas).
Nuclear energy: processes of obtaining nuclear energy, nuclear fuel, nuclear plants (reactors, power plants), nuclear waste (regulations).
New technologies (fuel cells, compressed hydrogen…).
Energy storage: general part, accumulation of hydro energy, electrochemical energy storage (batteries), process of electrolysis, accumulated energy of compressed hydrogen, accumulation of flywheel energy.
Practice
Solving tasks and examples from selected fields covered in the theoretical part of teaching

Required Reading:

J. Tester, E. Drake, M. Driscoll, M. Golay, Sustainable Energy, The MIT Press, GB, 2005.

Weekly Contact Hours: 4	**Lectures:** 2	**Practical work:** 2

Teaching Methods:

Lectures, Auditory and Computer Practice, Mentor work, Consultations. Students work on the seminar paper in groups for

the chosen field/topic by the mentor and they individually defend their work in front of the colleagues and the professor. Topic selection is in accordance with the student interests. The final examination covers the entire course and it is eliminatory. The final grade is formed based on the success on the seminar paper, test results and student activity during the lectures.			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	70
Practical work	20	oral exam	
Preliminary exam(s)			
Seminar(s)			