


Discipline	PHOTOVOLTAIC FACILITIES AND SOLAR POWER PLANTS code: 34 winter semester	
Specialty	RENEWABLE ENERGY SOURCES	
ECTS credits: 7	Form of assessment: Continuous assessment	
Lecturer	Assoc. prof. PhD Eng. MAIK STREBLAU Room: 702E Phone: +359 52 383 540 E-mail: streblau@tu-varna.bg	
Department	ELECTRICAL ENGINEERING AND ELECTROTECHNOLOGIES	
Faculty	ELECTRICAL ENGINEERING	

Learning objectives:

The discipline "Photovoltaic Facilities and Solar Power Plants" is included in the curriculum of students specializing in "Renewable Energy Sources." The content of the course is a continuation of the curriculum of the course "Renewable Energy Sources – basic course" studied in the 4th semester. The main goal of the discipline is to acquaint students with the physical principles, methods, design features, and technical characteristics of systems for converting solar energy into electricity. The program is in line with contemporary literary sources and material provision, including visual materials, computer programs, videos, demonstration and laboratory models, etc., based on multimedia techniques.

Cross-links with other disciplines: "Physics", "Electronics", "Thermodynamics and Heat Transfer" and "Renewable Energy Sources – basic course".

Outgoing links to other disciplines: "Design of Equipment and Systems for Production of Energy from Renewable Energy Sources - Photovoltaic Systems".

	Hours Lectures	Hours Laboratories	Hours Course Work
Solar energy status in the world. Development perspectives	2		
Solar resource	2		
Physical principles of converting solar energy into electricity. Solar cells. Parameters and characteristics. Equivalent circuits	6		
Types of solar cells. Production technology of solar cells	5		
Photovoltaics modules	3		
Interconnection of photovoltaic modules.	2		
The effect of shading on the operation of photovoltaic modules	2		
Photovoltaics systems. Structure. Features	8		
Calibration of pyranometers		2	
Analytical and experimental investigation of the influence of solar radiation on the open-circuit voltage and short-circuit current of a photovoltaic cell		2	
Studying the energy performance indicators of a photovoltaic module with changes in solar radiation and temperature		2	
Studying the impact of tilt angle on the energy performance indicators of a photovoltaic module		2	
Studying the influence of shading intensity on the energy performance indicators of a photovoltaic module		2	
Studying the influence of the light spectrum on the energy performance parameters of a photovoltaic module		2	
Studying the photovoltaic modules array characteristics in parallel and series connections		3	
Modeling and simulation of grid – connected PV systems			8
Modeling and simulation of standalone PV systems			7
TOTAL: 75 h	30	15	15