Study program: Electrical and Computing Engineering, Mechatronics, Engineering management

Type and level of studies: Doctoral Academic Studies

Course unit: Advanced Solar Technologies

Teacher in charge: Snežana Dragićević

Language of instruction: English

ECTS: 10

Prerequisites: -

Semester: Winter

Course unit objective:

The primary objective of this course is to equip students with comprehensive knowledge and practical competencies pertinent to the technical utilization, potentialities, and substantive importance associated with the harnessing of solar energy. Specific topics will be discussed in line with current scientific research, enabling students to engage in research in the area of converting solar energy into useful forms of energy.

Learning outcomes of Course unit:

After completing the course, students will be able to differentiate and describe various solar technologies and factors influencing the use of solar energy. They'll analyze the functionality of system components, assess the performance of solar cells and modules, explain correlations among different system parameters, utilize appropriate methods for modelling, simulation, and optimization of solar systems. They'll also argue the significance of applying solar energy from ecological and economic perspectives, independently use various scientific and practical information sources, and conduct team-based research in this field.

Course unit contents:

Theoretical classes

Solar energy potential. Thermal solar systems. The conversion of solar energy into electrical energy. New generations of solar cells. Concentrated solar power systems. Hybrid PVT solar systems. Solar power plants. Solar energy and the environment. Principles of economic evaluation of renewable sources of electrical energy.

Practical classes

The practical classes take place in the laboratory and computer classroom, encompassing: measurements of global solar radiation and insolation using an automated meteorological station and a laboratory solar power plant, as well as the design and simulation of the operation of a chosen solar system utilizing modern software tools. Part of the practical classes will take place in cooperation with industry partners.

Literature:

1. Antonio Luque, Steven Hegedus, Handbook of Photovoltaic Science and Engineering, John Wiley & Sons, ISBN 9780470721698, 2011.
2. John A. Duffie, William A. Beckman, Solar Engineering of Thermal Processes, Forth Edition, John Wiley & Sons, SBN 978-0-470-87366-3, 2013.
3. C. Julien Chen, Physics of Solar Energy, John Wiley & Sons, ISBN 9780470647806, 2011.
4. Gerard M. Crawley, Solar Energy, World Scientific Publishing Company, ISBN 978-981468949, 2016.

Number of active teaching hours: 7	**Lectures: 5**	**Practice: 2**

Teaching methods:

Theoretical lectures involves presentations, demonstrations, and discussions. Practical sessions encompass laboratory work, and study visits to solar power plant. Individual consultations with students during project development are also included.

Evaluation (maximum number of points 100)

Examination methods (maximum 100 points)

Project work - 40

Oral examination- 60