



**FACULTY:** ENVIRONMENTAL AND THERMAL POWER ENGINEERING

**COURSE TITLE:** Renewable Energy Sources

**Number of contact hours:** 60

**Duration:** 1 semester

**ECTS credits:** 6

**Programme description:** The Renewable Energy Sources course provides a graduate level understanding of the conversion principles and technology behind various renewable energy sources. It also examines the issues involved in the integration of various renewable energy sources and their economics for heat and power needs. Specific problems discussed during lectures, laboratories and projects will cover:

- Applications of solar energy. Solar heat collectors. Solar photovoltaic systems. Examples of application. Trends in solar energy utilisation.
- Wind Energy: Basic properties of wind energy. Applications of wind energy. Wind turbines. Operative characteristics of wind turbines. Wind power plant. Examples of application. Trends in wind energy utilisation.
- Hydropower: Basic properties of water energy. Available energy of water flow. Hydropower plants. Utilisation of hydropower – examples. 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. Trends in hydrogen utilisation.
- Biomass Energy: Transformation of biomass energy. Technologies for utilisation of biomass – examples. Trends in biomass energy utilisation.
- Geothermal Energy. Heat Pumps. Examples of application.

During the course Students will gain new skills and competences. Students will understand basic characteristics of renewable sources of energy and technologies for their utilization. They will understand the requirements for design, components and principle of operation for renewable energy systems.

**Course type:** Lectures (30), Laboratories (15), Project (15)

**Literature:**



1. F. Kreith, D. Yogi Goswami, (Ed.), Handbook of energy efficiency and renewable energy, CRC Press, 2007
2. B. Sorensen, Renewable energy conversion, transmission and storage, Academic Press, 2007
3. V. Quaschnig, Understanding Renewable Energy Systems, Earthscan, 2005
4. Boyle, Godfrey. Renewable Energy: Power for a Sustainable Future, Third Edition. Oxford University Press, 2012.
5. Tester, et al. Sustainable Energy, Choosing Among Options, 2nd Edition. MIT Press, 2012.

**Assessment method:** test, individual project, reports on laboratory exercises

**Lecturer:** Piotr Cisek

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