



FACULTY: ENVIRONMENTAL AND THERMAL POWER ENGINEERING

COURSE TITLE: Hydraulic and Wind Turbines

Number of contact hours: 45

Duration: 1 semester

ECTS credits: 5

Programme description: The course comprises lectures and workshops. Energy sources that can be regenerated are great to take advantage of for our massive energy needs. The topic of the classes is a description of the use of the two most popular ones, i.e. wind and water. Specific problems discussed during lectures and workshops will cover:

- introduction to the fundamentals of hydraulic and wind energy
- hydraulic turbine principles: velocity triangle, force, power, efficiency
- hydraulic turbine design and classification, specific speed
- hydraulic power plant, losses and cavitation in hydraulic turbine system
- wind energy, resources and available power
- aerodynamic of wind turbine, lift and drag force
- performance of the wind turbine and wind energy conversion system, tip speed ratio
- wind turbine design and classification
- hydraulic/wind plant performance evaluation and energy production

Students will gain new skills and competences. During the classes, the student will get familiar with issues related to the construction and design of hydraulic and wind power plants. They will know how modern hydraulic and wind turbines should be designed and economically operated.

Course type: lectures (30), workshops (15),

Literature:

1. Cengel Y.A., Cimbala J.M. "Fluid Mechanics Fundamentals and Application", Mc Graw-Hill, 2009
2. Da Rosa A. "Fundamentals of Renewable Energy Processes" Elsevier, New York 2009
3. Finnemore E.J., Franzini J.B. "Fluid Mechanics with Engineering Applications", McGraw-Hill, 2009



4. Manwell J.F., McGowan J.G., Rogers A.L. "Wind Energy Explained; Theory, Design and Application", John Wiley and Sons
5. Potter M.C., Wiggert D.C. "Mechanics of Fluids", Cengage Learning, 2010
6. Zueb H., Zulkifly A., Zainal A. "Basic Fluid Mechanics and Hydraulic Machines" CRC Press, Taylor & Francis Group, New York 2007

Assessment method: test, joint group projects

Lecturer: Piotr Dzierwa

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