



Course title: Power Engineering Audit

ECTS credit allocation (and other scores): 2

Semester: spring

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 15+15

Course coordinator/ Department and e-mail: Maciej Neugebauer, Department of Electrical, Power, Electronic and Control Engineering, mak@uwm.edu.pl

Type of classes: classes and lectures

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#### Substantive content

**CLASSES:** Preparation of energy performance certificates for buildings a) calculation of the seasonal heat demand for heating according to different Polish and International Standards: b) calculation of heat demand for domestic hot water preparation: c) calculation of energy costs for heating, domestic hot water and ventilation. Calculation of warm bridges according to Polish Standards - linear and point. Calculation methodology - the method of daily balances for specific differences of internal (design) and external temperatures.

**LECTURES:** Thermal protection of the building. a) determining the data for the calculation of energy indices: geometric and dimensional characteristics as well as thermal bridges, b) determining the physical properties of building materials and products, c) calculating the values of heat transfer coefficients of building partitions in accordance with PN EN ISO 6946, d) assessment of the tightness of partitions, e) interpretation of the results of heat transfer tests through building partitions using the thermovision method and leakage tests. f) assessment of the building's thermal protection status. Heating. Domestic hot water. Ventilation and air conditioning. Room lighting. Calculation methodology.

**Learning purpose:** Teaching students to prepare energy performance certificates for buildings.

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On completion of the study programme the graduate will gain:

**Knowledge:** Knows and understands the phenomena and physical processes in nature, in particular in heat loss.

**Skills:** Can make a preliminary economic analysis of the undertaken engineering activities.

**Social Competencies:** Can think and act in an entrepreneurial way in real conditions.

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**Basic literature:** F. William Payne, John J. McGowan, Energy Management and Control Systems Handbook, Springer-Verlag New York Inc., 2012; G. Thomason, Energy Engineering and Management, ML Books International – IPS, 2017; M. Krarti, Energy Audit of Building Systems: An Engineering Approach, Third Edition, CRC Press, 2016

**Supplementary literature:**

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The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 32

Student's independent work: 19