

Course title: Measurement Systems

ECTS credit allocation (and other scores): 2

Semester: autumn

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

Substantive content

CLASSES: Measurements of basic electrical quantities: current, voltage, power, resistance in AC and DC circuits. Calculation of absolute and relative errors of measurement. Transfer of measurement uncertainties. Mathematical analysis of the obtained results: interpolation, extrapolation and approximation. Analysis of systematic and random errors. Creating a simple application in VisalBasic and LabView (and others) that allows to connect and read the measurement from an electronic meter on a computer, archiving and operating on the obtained measurement results.

LECTURES: Basic concepts of measurement theory and metrology. Measurement errors. Measurement uncertainty and measurement error. Absolute and relative errors of measurement with analog and electronic meters. Analysis of uncertainties type A and B. Physical basics, principles of operation and construction of analog meters. Construction and operation of electronic (digital) meters. Processing and recording of analog and digital signals. Measuring converters. Measurement systems using PCs and other data archiving methods. Data communication standards and protocols (RS 232, USB, Ethernet etc.).

Learning purpose: Ability to calculus of measurement uncertainties, build simple measurement systems.

On completion of the study programme the graduate will gain:

Knowledge: Know basic concepts, mathematical description used in measurements and in measurement uncertainty.

Skills: Able to design and connect simple measuring system for various physical parameters.

Social Competencies: Understands the need to learn and improve throughout their professional career.

Basic literature: J. Bentley, Principles of Measurement Systems, Pearson 2005; W. Nawrocki, Measurement Systems and Sensors, ArtechHouse 2005; BROCK, Fred V., et al. Meteorological measurement systems. Oxford University Press, USA, 2001.

Supplementary literature:

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 32

Student's independent work: 33