

DESCRIPTION OF THE COURSE

Name of the course: Elements of Industrial Automation	Code: BIE62	Semester: 7
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 1 hour	Number of credits: 4

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Industrial Engineering BEng programme of the English Language Faculty of Engineering.

AIMS AND OBJECTIVES OF THE COURSE: To provide knowledge on elements, used in process automation and control systems, and their properties and applications.

DESCRIPTION OF THE COURSE: The main topics concern: Transducer of non-electrical quantities (nozzle-and -flapper, velocity and acceleration, torque and shaft power transducers; flow measurements; temperature and humidity) - block diagrams, static and dynamic characteristics, transfer functions; nonlinearity, connection; Process controllers - classification, control laws, mathematical description and characteristics; Electrical controllers - on-off, analogue with pulse-width modulated output and on operational amplifiers, digital microcomputer-based, programmable logic controllers (function blocks, programming languages, controller networks); Pneumatic and hydraulic control elements - amplifiers, integrators, differentiators, feedback elements, controllers; Final control elements - actuators, positioners, valves; Principles of data transmission - communication standards and systems, noise elimination, transmitters, data conversion, coding, compression, modulation.

PREREQUISITES: Control Theory, Measurement and Instrumentation, Electrical Engineering, Electronics, Industrial Electronics and Electrical Drives, Computing, Fluid Mechanics.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work from laboratory manual, work in teams, protocols preparation and defence.

METHOD OF ASSESSMENT: A three-hours exam at the end of the semester (75%) plus laboratories (25%).

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. Yordanova S., N.Kolev, R.Litchev. Elements of Industrial Automation. TU-Sofia, 1998;
2. Morris N.M. Control Engineering. McGraw-Hill Book Company, 1991;
3. Leigh J.R. Applied Digital Control. Prentice Hall, 1992;
4. Warnock I.G. Programmable Logic Controllers. Prentice Hall, 1988;
5. Popovic D. Distributed Computer Control for Industrial Automation, Marcel Dekker, 1990.