

## DESCRIPTION OF THE COURSE

Name of the course: <b>Control Engineering</b>	Code: BIE58	Semester: 7
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 2hours	ECTS credits: 4

**COURSE STATUS IN THE CURRICULUM:** For all students in the BEng. programme in the specialty Industrial Engineering of the English Language Faculty of Engineering.

**AIMS AND OBJECTIVES OF THE COURSE:** At the end of the course, the students must be able to apply the basic method of analysis and design of continuous-time, discrete time control systems and to use them in solving engineering problems. The course creates and develops knowledge's and skills of the students in the field of operation and creation of the control systems of unified systems for automation in the field of production.

**DESCRIPTION OF THE COURSE:** Mathematical modeling of systems; Block diagrams and signal flow graphs; First-order and second-order systems; Stability, steady-state error and speed of response; Frequency domain analysis; Analysis in the s-plane; System compensation; Controllers; Main blocks in the control loop; Frequency domain design; Control loops; Empirical design methods; Common nonlinearities (nonlinear elements) in control systems. A theoretical basis simultaneously extends, the system connections and applied skills in preparation of the students in area are specialized of analog and microprocessor engineering, pneumatic systems, link and hydraulic means; the digital controllers and PC-control systems. The discipline trains the students in the field of a research, designing, choice, evaluation of process control systems automation.

**PREREQUISITES:** Physics, Technical Mechanics, Control Theory, Measurement and instrumentations, Electronics, Elements of industrial automation.

**TEACHING METHODS:** Lectures with slides, case studies, course work, laboratory work with laboratory manual, work in teams, protocols preparation and defense.

**METHOD OF ASSESSMENT:** One three-hour examination at the end of semester (80%) plus laboratories (20%).

**INSTRUCTION LANGUAGE:** English.

### **BIBLIOGRAPHY:**

1. Хинов, Х., К.Наплатаров. Автоматизация на технологични процеси. С., Техника, 1987;
2. Хаджийски, М. Проектиране на системи за изследване на технологични обекти. Част 1 и 2. С., Техника, 1989;
3. Хинов, Х., К.Наплатаров, Г.Сапунджиев, С.Йорданова и др. Автоматизация на технологични процеси, Ръководство за лабораторни упражнения. С., Техника, 1991;
4. Рей, Ъ.Х. Методы управления технологическими процессами, М., Мир, 1983;
5. Изерман, Р. Цифровые системы управления. М., Мир, 1984;
6. Franklin, G.F., J.D.Powell, M.L.Workman. Digital Control of Dynamic Systems. Addison-Wesley Publ.Company, 1990;
7. Dorf, D.C. Modern Control Systems. Addison-Wesley, 1993;
8. Astrom, K.J., B.W.Wittenmark. Adaptive Control. Addison-Wesley, 1988.