

DESCRIPTION OF THE COURSE

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| Name of the course: Control Theory II | Code: BIE63-1 | Semester: 7 |
| Type of teaching: Lectures and laboratory works | Lessons per week: L – 2 hours; LW - 1 hour | Number of credits: 4 |

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

AIMS AND OBJECTIVES OF THE COURSE: To give knowledge on the modern methods for analysis and design of robust and optimal control systems. To develop skills for description of uncertain systems, robust stability and robust performance analysis, to perform H_∞ design and μ - synthesis of multivariable control systems. To develop practical skills for using MATLAB in the robust analysis and design of control systems.

DESCRIPTION OF THE COURSE: The main topics concern: Properties of multivariable feedback systems, application of the singular values in the analysis of multivariable systems, H_2 and H_∞ norms of transfer matrices, uncertainty description, application of the linear fractional transformations, obtaining of unstructured and structured uncertainty models, properties of the structured singular value, robust stability and robust performance, mixed sensitivity H_∞ design, H_∞ loop shaping, μ synthesis and D-K iterations. Program language – MATLAB.

PREREQUISITES: Mathematics I, II, III, IV, Physics, Mechanics, Computing, Electrical Engineering, Control Theory I.

TEACHING METHODS: Lectures, laboratory work from laboratory manual, work in teams, protocols preparation and defense.

METHOD OF ASSESSMENT: Three and a half hours written test at the end of 7th semester. The test carries up to 80% of the final marks. Defense of protocols from laboratory works (up to 20%).

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. Zhou, K., Doyle, J.C. and Glover K. Robust and Optimal Control, Prentice-Hall, 1996;
2. Skogestad S. and Postlethwaite I., Multivariable Feedback Control. Analysis and Design, John Willey & Sons, 1998;
3. Petkov P., Christov N., Konstantinov M., Computational Methods for Linear Control Systems, Prentice-Hall, 1991.