

## DIGITAL CONTROL SYSTEMS

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
3	108	Practical Assignment Defense

The course is devoted to the study of analysis and synthesis of discrete control systems. The course deals with the issues of transform from a continuous system description to a discrete one, issues of stability analysis, including the root criterion and the Lyapunov method, issues of synthesis of a stabilizing controller, a tracking system and the synthesis of estimation devices for systems with incomplete information, including those subject to external disturbances.

### Course structure:

#### 1. MATHEMATICAL MODELS OF DISCRETE OBJECTS

- 1.1. Model input-output
- 1.2. Model input-state-output
- 1.3. Transition from the input-output model to the input-state-output model
- 1.4. Transition from a continuous description of a system to a discrete one

#### 2. STABILITY OF DIGITAL (DISCRETE) SYSTEMS

- 2.1. Root stability criterion
- 2.2. Lyapunov equation for studying the stability of a discrete system

#### 3. ANALYTICAL METHODS FOR DESIGNING CONTROLLERS OF DIGITAL SYSTEMS

- 3.1. Modal control method for designing a discrete controller
- 3.2. Internal model method for constructing a discrete controller

#### 4. ANALYTICAL METHODS FOR CONSTRUCTING CONTROLLERS OF DIGITAL SYSTEMS FOR OBJECTS AND EXTERNAL INFLUENCES WITH RESTRICTIONS ON THE MEASURED VARIABLES

- 4.1. Full Dimension Observer Synthesis
- 4.2. Synthesis of an Extended Dimension Observer