ITMO University

Technical Systems Modeling

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
3	108	Ungraded test

The discipline focuses on the fundamentals of control theory and the principles of mathematical modeling for different system models.

Course structure:

1. Methodology of mathematical modeling

1.1. The concept of a mathematical model
1.2. Mathematical modeling and system theory
1.3. Mathematical modeling and system analysis
1.4. Complex and simple systems. Decomposition
1.5. Model classification

2. Linear control systems

2.1. Stability of linear systems
2.2. Linear operators
2.3. Models of linear systems

3. Nonlinear control systems

3.1. Stability of nonlinear systems
3.2. Local stability analysis
3.3. Linear matrix inequalities
3.4. Global stability analysis
3.5. Oscillatory systems
3.6. Bifurcations
3.7. Chaotic systems

4. Discrete control systems

4.1. Discrete models
4.2. Stability of discrete systems
4.3. Forms of discrete systems
4.4. Discretization

5. Delayed control systems

5.1. The solution concept and the step method