ITMO University

Networked and Multi-Agent Systems

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

The discipline focuses on methods for studying the dynamics of networked and multi-agent systems, studying the foundations of graph theory and the properties of Laplace matrices.

Course structure:

1. Artificial neural networks

1.1. Neuron model
1.2. Forward propagation
1.3. Back propagation
1.4. History of artificial neural networks
1.5. Convolutional and recurrent neural networks

2. Graphs and networks

2.1. Basics from graph theory
2.2. Laplace matrix
2.3. Agaev-Chebotarev theorem

3. Passification and hyper-minimum-phase systems

3.1. Passivity
3.2. Hyper-minimum-phase system
3.3. Passification theorem

4. Synchronization in networks of linear agents

4.1. Statement of the synchronization problem for networks of linear agents
4.2. Conditions for ensuring synchronization in the case of a balanced graph

5. Synchronization in networks of nonlinear agents