International Master's degree program
MASTER OF SCIENCE
Specialty: «ADVANCED CYBERNETICS (CYBERNETICS 2.0)»

Language: English

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Prerequisites of Program Creation

Pressing problems: joint solution of control, information and communication and computation problems with application to complex interdisciplinary systems such as organizational and technical, social, ecological, manufacturing, economic and other ones.

Requirements: training of modern engineers with a wide range of competence in research, design and applications under the common program **"Cybernetics 2.0."**

This specialty **is demanded for in international practice**, as its development involves many research and applied research centers and universities worldwide.

Historically and presently, **Department of Radio Engineering and Cybernetics unites a unique competence system of associated chairs and companies working in this direction.** The core is the theory of control in organizations which has been developed by the authors of the program for several decades. This allows integrating several existing training courses, as well as creating and maintaining a modern Master's degree program.

The Major Objective and Mission of the Master Program, Compliance with Modern Requirements

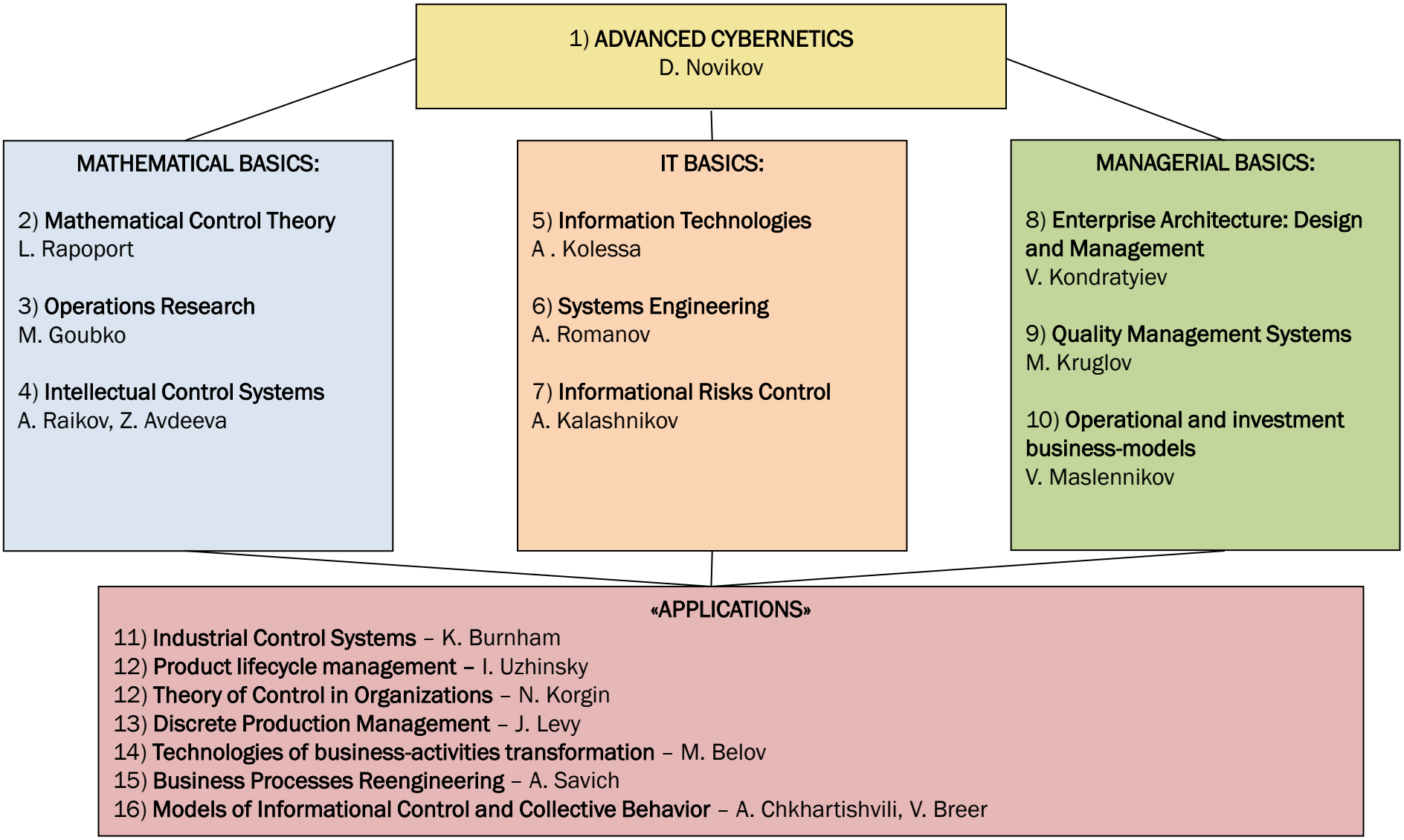
Program objective: training of professional engineers with high research and application-oriented skills in designing modern and promising complex organizational and technical systems and competence at the junction of the following fields:

- Control theory for interdisciplinary systems
- System engineering
- Activity organization methodology in active systems
- Solution methods for organization and control problems in engineering and production activity
- Information systems and ICT in complex systems control
- Applications in organization and control systems for activity processes and product lifecycles.

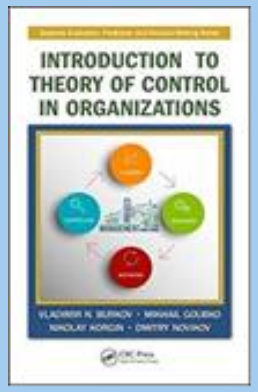
Compliance with

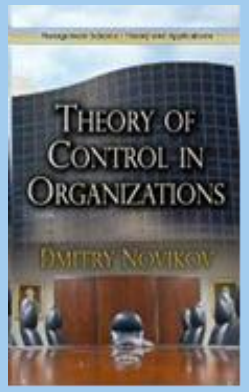
- The Russian Educational Standards and the Educational Principles of Moscow Institute of Physics and Technology (MIPT)
- The CDIO engineering education model and the educational principles of IEEE
- The European Education System including
- the European Credit Transfer System (ECTS)

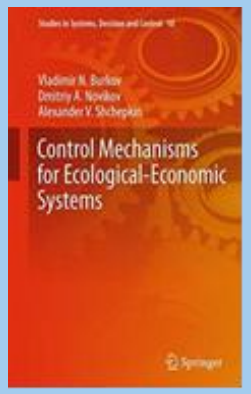
The Architecture of the Educational Complex adopted in the Program

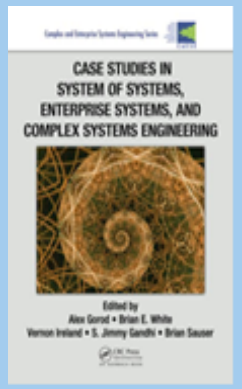


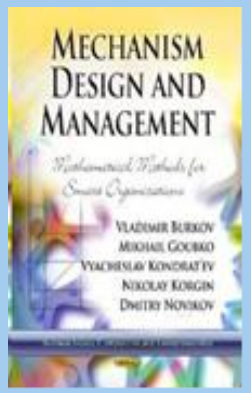
Textbooks and Monographs Published by the Program Lectures on the Subject Domain

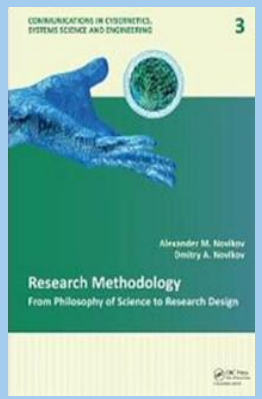












Program Features

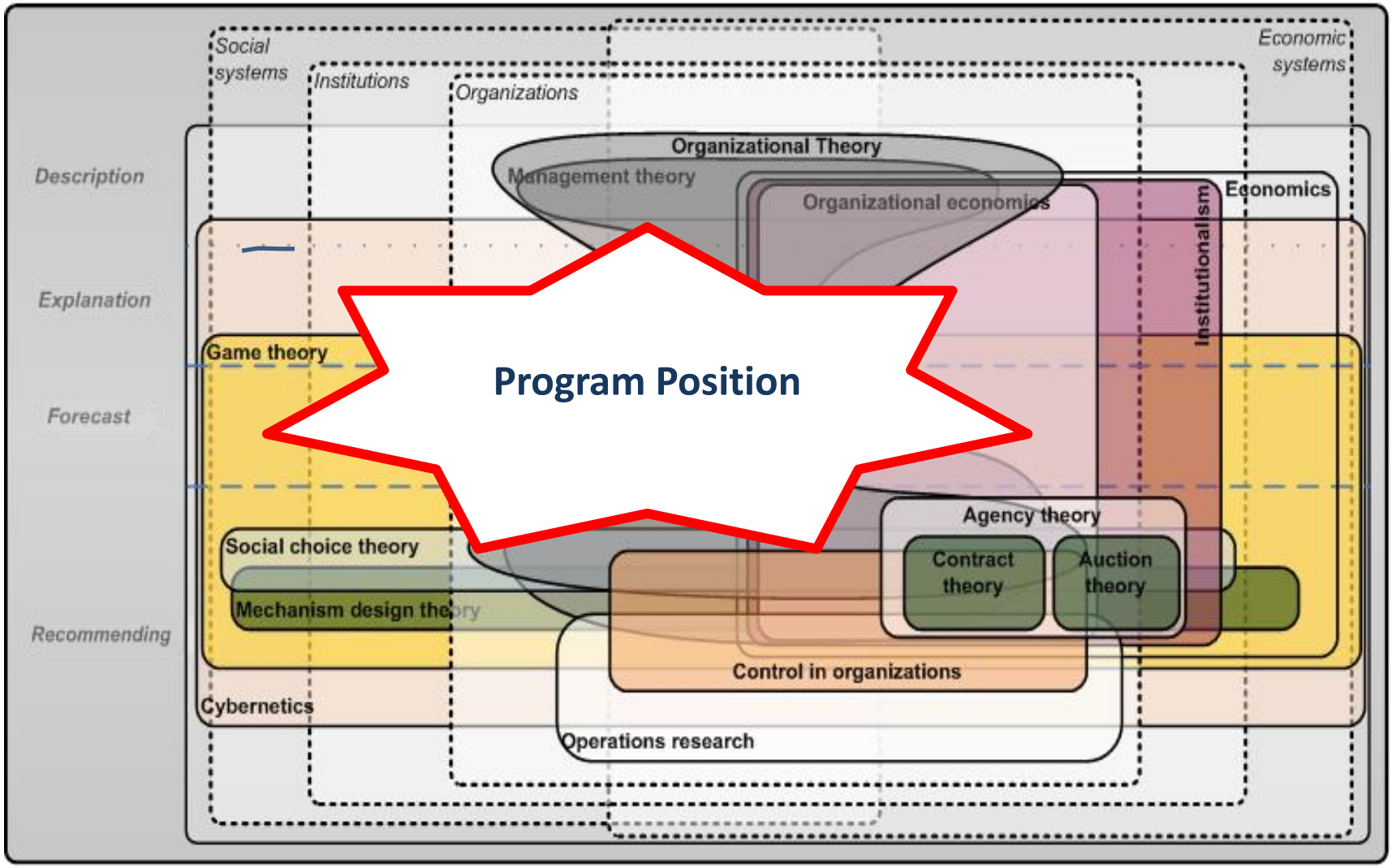
- ✓ Represents **a cross-functional composite program** of several departments at MIPT under the overall coordination of Control Problems Chair (the core chair at Department of Radio Engineering and Cybernetics located at Trapeznikov Institute of Control Sciences, Russian Academy of Sciences).
- ✓ Aims at **creation and further development of a unique competence complex** in the fields where MIPT and its partners have reached the international level of expertise, see the textbooks and monographs published in English by leading international houses.
- ✓ Is oriented towards **gradual extension** (during the learning process) of the original variable part of the program owing to distant learning courses.
- ✓ Allows **implementation in some international partner universities**, e.g., in Cyprus (”exporting the educational products of MIPT”).

Appendix 1. Requirements to Potential Students

Advanced graduate students, some specializing in control theory and mathematical modeling, while others focusing on R&D management, indicates that for students to take the best advantage, several study courses are necessary prerequisites as a background:

- **Bachelor's degree** (or equivalent) in Cybernetics (minimum six-semesters) or Control Engineering or in closely related fields is required;
- **TOEFL** (not required if an applicant is a native English speaker or received his previous degree from a university in the USA, UK, Canada, Australia or New Zeland);
- The group of **applied mathematics courses**. Single(at least)-term courses in system modeling (models of systems, simulation, and system dynamics), decision theory (analysis, linear and nonlinear optimization, probability, and especially basics of game theory, and graph theory (combinatorial analysis and discrete optimization, scheduling and supply chain management) provide the required knowledge of the underlying mathematical framework;
- The group of courses in different aspects of **business administration** gives students the necessary background in typical management problems, traditional recipes for their solutions, and also, the best practices. The most important areas of managerial activity are: corporate governance, project management, HR and career management, and corporate finance.
- The group of **IT courses** provides the required knowledge of the framework of data analysis, decision support systems, simulation of complex organizational/technical systems, etc.

Appendix 2. The Position of the Program in the System of Modern World-leading Educational Methodologies and Programs



Appendix 3. “Competitors” of the Program

MIT: M.Sc. System Design and Management

Stuttgart University: M.Sc. Engineering Cybernetics

CalTech: M.Sc. Engineering & Applied Science

Norwegian University of Science and Technology: M.Sc. Cybernetics and Robotics

University of Tokyo: M. Sc. Information Physics and Computing

Nottingham Trent University: M. Sc. Engineering (Cybernetics and Communications)

University of Reading: M.Sc. MRes Systems Engineering