

**KNRTU-KAI, Kazan, Russia**  
**DESCRIPTION OF THE PROMENG Curricula/Module**

TITLE OF THE MODULE	Code
Modern Theory of Solving Inventive Problems	M.2.B.OI.2

Teacher(s)	Department
<b>Coordinating:</b> Senior Lecturer Artur K. Gaysin <b>Others:</b>	Radioelectronic and telecommunication systems

Study cycle	Level of the module	Type of the module
Master	Third semester	Optional

Form of delivery	Duration	Langage(s)
Lectures and seminars	18 weeks	Russian

Prerequisites	
<b>Prerequisites:</b> Not	<b>Co-requisites (if necessary):</b> Not

Credits of the module	Total student workload	Contact hours	Individual work hours
4	108	48	60

Aim of the module (course unit): competences foreseen by the study programme		
The goal of the course is to provide students with the skills of creative thinking skills with use The theory of inventive problem solving (TRIZ or TIPS) models, student learning methods for solving inventive problems, identify and use laws, patterns and trends of engineering systems.		
Learning outcomes of module (course unit)	Teaching/ learning methods	Assessment methods
Students are aware and know how to apply: - The standard model and the radical contradictions model - Specialized and fundamental transformation model;	Lecture, case-technology	Evaluation knowledge methodology of TRIZ , interpretation models based on testing and individual assignments.
Practical use the skills of inventive problem solving using algorithms and procedures of extraction, transformation of reinventing models.	Case technology, discussion	Assessment of the level of ownership of TRIZ methods, and the possible development of a plan for action in the performance of individual tasks.

Themes	Contact work hours						Time and tasks for individual work		
	Lectures	Consultations	Seminars	Practiac work	Laboratory work	Placements	Total contact work	Individual work	Tasks
1. Introduction to the Theory of Inventive Problem Solving. The structure of the course	1						1	5	Providing an idea about the place of TRIZ in the process of engineering creativity
2. Key primary model of TRIZ	2			2			4	8	Formation of skills to identify inconsistencies
3. Extraction of the primary models	2			4			6	8	Formation of skills extracting models of objects, studying the catalog of models of transformation
4. Reinventing of effective solutions	2			8			10	8	Formation skills of effective methods of the Invention

5. The Enhanced initial model. The Operational area	2		4		<b>6</b>	<b>8</b>	The prediction of conflicts in complex systems
6. Fault management	1		2		<b>3</b>	<b>8</b>	Possession of development strategies of complex systems
7. Adaptation of models and methods on practice	2		16		<b>18</b>	<b>15</b>	Testing inventive problem solving skills on practice
<b>Total</b>	<b>12</b>		<b>36</b>		<b>48</b>	<b>60</b>	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Running control - a written test of primary extraction models	30	7 <sup>th</sup> week	The application of theoretical knowledge to identify patterns in complex systems.
Intermediate control - checking the extraction methods and reinventing	30	14 <sup>th</sup> week	The ability to simulate the process of the invention of complex systems; skills to generate new ideas based on algorithms of TRIZ.
Final exam - the written test of practical skills	40	18 <sup>th</sup> week	Proficiency in the skills of effective inventive problem solving through the application of methods and algorithms of TRIZ.

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
<b>Compulsory literature</b>				
Орлов М.А.	2010	Азбука ТРИЗ. Основы изобретательского мышления. – М: СОЛОН-ПРЕСС – 208 с.: ил.	6	Foundation of RTS department
Орлов М.А.	2010	Первичные инструменты ТРИЗ. Справочник практика. – М: М: СОЛОН-ПРЕСС – 128 с.: ил.	6	Foundation of RTS department
Орлов М.А.	2006	Основы классической ТРИЗ. Практическое руководство для изобретательного мышления. – 2-е изд. – М.: СОЛОН-ПРЕСС. 2006. – 432 с: ил.		Web resource of RTS department
<b>Additional literature</b>				
Урзаев В.Г.	2006	ТРИЗ в электронике: учебник. – М.: Техносфера – 320 с.	5	Libraries of educational buildings № 1, 5 KNRTU-KAI
		Website of Modern TRIZ Academy		<a href="http://www.easytriz.com">http://www.easytriz.com</a>
		Official website G.S. Altshuller		<a href="http://www.altshuller.ru/">http://www.altshuller.ru/</a>
		Website of Innovation Managers Community		<a href="http://www.ariz.ru">http://www.ariz.ru</a>