BMSTU, RU
DESCRIPTION OF THE PROMENG Curricula/Module

TITLE OF THE MODULE	Code
The solution of engineering problems (MTRIZ)	

Teacher(s)	Department
Coordinating: Navasardian E.S. **Others:** Dontsova E.S., Lavrov N.A.	Department E4 of BMSTU

Study cycle	Level of the module	Type of the module
Master	The variable part of the curriculum	Elective course

Form of delivery	Duration	Langage(s)
lectures	one semester	Russian

Prerequisites	
Prerequisites: lecture courses: "Modern cryogenic systems", "Analysis and design of machines and equipment of cryogenic systems"	**Co-requisites (if necessary):** No

Credits of the module	Total student workload	Contact hours	Individual work hours
3	102 hours	34	68

Aim of the module (course unit): competences foreseeen by the study programme		
Formation and development of any product and process fraught with many problems and contradictions. The pace of competition is constantly increasing, which leads to an exacerbation of problem situations by reducing the time to develop effective solutions. Discipline "Applied methodology and practical tools of effective innovation (Modern TRIZ)" or abbreviated, MTRIZ, intended to form the audience a strong practical skills of effective ideas and solutions to difficult situations with limited time to work through solutions and if necessary, to overcome sharp differences . At the heart of the course on methods and tools of the theory of inventive problem solving (TRIZ) developed by the author in the direction indicated by a modern TRIZ. Teaching methods are based on the author's methods of extracting new models and reinventing effective solutions to simple and effective model of Meta-Algorithm of Invention and application examples MTRIZ in different countries and different companies.		
Learning outcomes of module (course unit)	**Teaching/learning methods**	**Assessment methods**
1. Knowledge and practical skills of the universal system model to develop effective technical solutions to improve the products and technologies to improve any technical objects and processes.	**Lectures, Seminars, Individual work**	Interim certification, the final pass
2. Knowledge of and ability to identify basic mechanisms for creating innovative solutions to any object in order to extract the creative experience, realized in the object under study.	**Lectures, Seminars, Individual work**	Interim certification, the final pass
3. Knowledge of and ability to identify root causes and controversies, objectively leading to the creation of effective solutions.	**Lectures, Seminars, Individual work**	Interim certification, the final pass
4. Knowledge of and ability to apply the laws of technical systems for the design of effective informed decisions on any site	**Lectures, Seminars, Individual work**	Interim certification, the final pass

improvements or new development.		
5. The special skill of independent (non-instructor) approach to solving problems with severe systemic contradictions to guarantee an effective solution to create and regular tseleorientirovannyh ideas.	**Lectures, Seminars, Individual work**	Interim certification, the final pass

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practiacl work	Laboratory work	Placements	**Total contact work**	**Individual work**	**Tasks**
1. Contradiction as an attribute of development	2	0	2	0	0	Э4	**4**	**10**	1. Standard contradiction. 2. The radical contradiction
2. Extraction of the primary model	2	0	2	2	0	Э4	**6**	**10**	1. Effective models. 2. Extraction. 3. Initial and in-depth extraction.
3. Reinventing of EFFECTIVE SOLUTIONS	2	0	2	2	0	Э4	**6**	**12**	1. A meta-algorithms. 2. Reinventing. 3. The solution of standard contradictions. 4 The solution of radical contradiction.
4. OPERATIONAL AREA	2	0	2	0	2	Э4	**6**	**12**	1. The structure of the operational area. 2. Resources of operational zone. 3. Perfect simulation.
5. MANAGEMENT SOLUTION	2	0	2	0	2	Э4	**6**	**12**	1. Noosphere of creativity. 2. The laws of systems development: - S-curve - 9-screen model - "Ideal formula" - The basic laws.
6. ADAPTATION OF MODELS AND METHODS TO PRACTICE	2	0	2	0	2	Э4	**6**	**12**	Reports on the examples of students.
Iš viso	**12**		**12**	**4**	**6**		**34**	**68**	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Issues in practical classes	20%	The end of	Current Rating

		practice session	
Report on the material traversed themes	30%	End of topic	An interim pass
The final pass	50%	End of semester	The final pass

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or intrenet link
Compulsory literature				
Орлов М.А.	2010	Основы классической ТРИЗ. Вводный курс высокоэффективного инновационного мышления. – 4-е издание., испр. и доп.		Москва: СОЛОН-ПРЕСС
Орлов М.А.	2010	Нетрудная ТРИЗ. Универсальный практический курс для специалистов нового поколения.		Москва: СОЛОН-ПРЕСС
Орлов М.А.	2010	Азбука ТРИЗ. Основы изобретательного мышления		Москва: СОЛОН-ПРЕСС
Additional literature				
Альтшуллер Г.С.	2007	Найти идею: Введение в ТРИЗ		Москва: Альпина Бизнес Букс
Альтшуллер Г.С.	2004	Творчество как точная наука		Петрозаводск, Скандинавия
Альтшуллер Г.С. Верткин И.М.	1994	Как стать гением: Жизненная стратегия творческой личности		Минск, Беларусь