

Ministry of Science and Higher Education of the Russian Federation
 Federal State Budgetary Educational Institution of Higher Education
Perm National Research Polytechnic University

APPROVED BY

Pro-rector for Academic Affairs

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**ACADEMIC COURSE WORKING PROGRAM**

Academic course: Innovative economy and technological entrepreneurship
 (Name)

Form of education: Full-time
 (Full-time /full-time – correspondence/correspondence)

Level of higher education: Bachelor's degree
 (Bachelor's program/specialist program/
 Master's program)

Workload in hours (in credits): 216 (6)
 (Hours (CU))

Training program (degree): 21.03.01 Oil and Gas Engineering
 (Code and denomination of degree)

Direction: Oil and Gas Engineering (general type, IES)
 (Title of curriculum)

1. GENERAL PROVISIONS

1.1. GOALS AND OBJECTIVES OF THE COURSE

The goal of the course is to form students' theoretical knowledge and practical skills in the sphere of economy, technology entrepreneurship and innovative project management.

Objectives of the Course:

– studying the theoretical foundations of innovative economy and entrepreneurship, including the key concepts of entrepreneurship, motivation, organization, and support of entrepreneurial activity, including commercialization of innovations and high-tech business development;

– acquiring the ability to identify market opportunities, analyze and model projects in the field of technological entrepreneurship; organize teamwork to achieve the set goals;

– acquiring skills in the market of high-tech commercialization, independent development of elements of entrepreneurial projects and presentation of their results.

1.2. STUDIED OBJECTS OF THE COURSE

Processes of innovation, commercialization and entrepreneurship; processes for setting up a new business; business process modeling; market and product research in the process of commercialization and entrepreneurship; elements of business planning.

1.3. STARTING CONDITIONS

Unstipulated

2. PLANNED RESULTS OF THE COURSE TRAINING

Competence	Indicator's Index	Planned Results of the Course Training (to know, to know how, to master)	Indicator of Attaining Competence which the planned results of training are correlated with	Means of Assessment
1	2	3	4	5
UC-1	IA-1.UC-1	To know how to search, to make critical analysis and synthesis of information aimed at solution of the given professional tasks.	Knows principles of organization, management and evaluation innovative-entrepreneurial activities; basics commercialization innovation and development highly technological business's	Case study task

1	2	3	4	5
	IA-2. _{UC-1}	To be able to apply systemic approach on the basis of search, critical analysis and synthesis of information aimed at solution of science-oriented problems of professional field	Is able to form and take part in the work project team; conduct market analysis, use behaviors and competitive environment	Case study task
	IA-3. _{UC-1}	To master of search, synthesis and critical analysis of information in his professional field; is a master of systemic approach aimed at solution of the given tasks	Masters the methods of working on commercialization market high technology	Case study task
UC-2	IA-1. _{UC-2}	To know the approaches to the problems statement aimed at the achievement of the given target, possesses knowledge in choice of optimal ways of their solution; realizes the basic principles of economy operation as well as the economic development, the aims and forms of the state interest in the economy	Knows key theories of functioning innovative economy and technological entrepreneurship; key element innovative ecosystems and measures support for innovative economic development, activities	Case study task
UC-2	IA-2. _{UC-2}	To be able to choose optimal ways of solution of science-oriented tasks in professional field aimed at achievement of the given target; uses the methods of individual economic and financial planning aimed at achievement of the current and long-term financial goals	Is able to plan and design commercialization results intellectual activities in the form of start-ups; appraise efficiencies innovative activities	Case study task
UC-2	IA-3. _{UC-2}	To master the skills of determining the scope of professional tasks in the frames of the given target; the skills of the choice of optimal ways of their solution considering the current legal regulations and available resources; uses financial instruments for managing personal finances (personal budget), controls personal economic financial risks.	Masters the tools development business-models and business plans	Case study task

3. FULL TIME AND FORMS OF ACADEMIC WORK

Form of academic work	Hours in all	Distribution in hours according to semesters		
		Number of semester		
		5	6	
1. Holding classes (including results monitoring) in the form:	72	36	36	
1.1. Contact classwork, including:				
– lectures (L)				
– laboratory work (LW)				
– practice, seminars and/or other seminar-type work (PW)	64	32	32	
– control of self-work (CSW)	8	4	4	
– test				
1.2. Students' self-work (SSW)	144	72	72	
2. Intermediate attestation				
Exam				
Grading test	9		9	
Test (Credit)	9	9		
Course Project (CP)				
Course Work (CW)				
Workload in hours	216	108	108	

4. COURSE OUTLINE

Name of the units with the course outline	Full time of classroom activity in hours according to the forms			Full time of extracurricular work in hours according to the forms
	L	LW	PW	SSW
1	2	3	4	5
3rd semester				
Fundamentals of innovative economy and entrepreneurship	0	0	16	36
Introduction to the innovative economy and entrepreneurship				
Objectives and competencies of the business activities				
Technological and economic trends				
Team creation and development				
Market research and analysis	0	0	16	36
Consumer research				
Market analysis and evaluation				
TOTAL for the 3rd term	0	0	32	72
4th term				
Commercialization of technological developments	0	0	12	27
Creating and developing a startup	0	0	12	27
Product development				
Launching a product into the market				
Investment planning				
Innovative ecosystem and support of innovative activity				
Fund raising				
Assessment of project investment attractiveness				

1	2	3	4	5
Presentation of innovative projects	0	0	7	18
Innovative projects and products presentation characteristics and products				
TOTAL for the 4th term	0	0	32	72
Total for the course	0	0	64	144

Topics of exemplary practical work

Sl.No	Topic of practical (seminar) work
1	Introduction to the innovative economy and
2	Objectives and competencies of the business
3	Technological and economic trends
4	Team creation and development
5	Consumer research
6	Market analysis and evaluation
7	Commercialization strategies
8	Creating and developing a startup
9	Product development
10	Launching a new technological product
11	Innovative ecosystem and supporting innovations
12	Fund raising
13	Assessment of project investment attractiveness
14	Project presentation to various stakeholders

Topics of exemplary laboratory practice

Sl.No	Topic of laboratory work

5. ORGANIZATIONAL AND PEDAGOGICAL CONDITIONS

5.1. EDUCATIONAL TECHNOLOGIES USED FOR COMPETENCES FORMATION

Practical lessons are held by realization of the method based on active training: problem areas are determined, groups are formed. The following aims are pursued in the process of practical education: use of definite disciplines knowledge and creative methods in solving problems and decision-making; students' skill-building of teamwork, interpersonal communication and development of leadership skills; consolidation of the basic theoretical knowledge.

5.2. STUDENTS' MANUAL FOR THE COURSE STUDY

Learning the course students are recommended to fulfill the following positions:

1. Learning of the discipline should be done systematically.
2. After learning one of the course unit with the help of the text-book or lecture notes it is recommended to reproduce in memory the basic terms, definitions, notions of the unit.

3. Special attention should be paid to the reports on practical studies, laboratory works and individual complex tasks for self-work.

4. The topic of questions studied individually is given by the teacher at the lectures. Also the teacher refers to the literary resources (first of all, to the newly published in periodicals) in order the students understand the problems touched on the lectures in detail.

6. LIST OF TEACHING MATERIALS AND INFORMATION SUPPLY FOR STUDENTS' SELF WORK IN THE DISCIPLINE

6.1. PAPER-BASED COURSEWARE

Sl.No	Bibliographic entry (author, title, mode of publication, place, publishing house, year of publication, number of pages)	Number of copies in the library
1. Basic literature		
1	Johnson C. Intelligent Business Harlow : Pearsons Education Ltd, 2007	31
2. Additional literature		
2.1. Educational and scientific literature		
1	Pile L. Intelligent Business Harlow : Pearson Education Ltd, 2005	2
2	Proceedings of the 37th International IGIP Symposium "Engineering Competencies – Traditions and Innovations", Moskow, Russia, 7-10 September 2008 / . Moskow : IGIP : MADI (STU), 2008. 296 p.	1
2.2. Standardized and Technical literature		
3. Students' manual in mastering discipline		
4. Teaching and learning materials for students' self-work		

6.2. ELECTRONIC COURSEWARE

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/ local net; authorized free assess)
1	2	3	4
Additional literature	Henry O. Strictly Business. SPb: Lan, 2013.	URL: https://elib.pstu.ru/Record/lan31760	authorized free assess
Additional literature	In Focus: Berger`s Business : Perm: PSTU, 2008.	URL: https://elib.pstu.ru/Record/RUPSTUbooks133444	authorized free assess
Additional literature	Agile Data Warehousing Project Management. Business Intelligence Systems Using Scrum / New York : Elsevier, 2013.	URL: https://elib.pstu.ru/Record/RUPNRPUelib4229	authorized free assess

1	2	3	4
Additional literature	Business Intelligence : The Savvy Manager's Guide / New York : Elsevier, 2013.	URL: https://elib.pstu.ru/Record/RUPNRPUelib4249	authorized free assess

6.3. LICENSE AND FREE DISTRIBUTED SOFTWARE USED IN THE COURSE EDUCATIONAL PROCESS

Type of Software	Software branding
Operating systems	MS Windows 8.1 (subs.) Azure Dev Tools for Teaching)
Operating systems	Windows 10 (subs. Azure Dev Tools for Teaching)
Office applications	Microsoft Office Professional 2007. Licensed 42661567
General-purpose software	Dr.Web Enterprise Security Suite, 3000 licensed, PNRPU, RCNIT (Regional Center for New IT) 2017

6.4. MODERN PROFESSIONAL DATABASES AND INQUIRY SYSTEMS USED IN THE COURSE EDUCATIONAL PROCESS

Branding	Reference to information resource
Scientific library of the Perm National Research Polytechnic University	http://lib.pstu.ru/
Electronic library system Lan'	https://e.lanbook.com/
Electronic library system IPRbooks	http://www.iprbookshop.ru/
Informational resources of the ConsultantPlus Network	http://www.consultant.ru/

7. LOGISTICS OF THE COURSE EDUCATIONAL PROCESS

Type of classes	Name of the necessary basic equipment	Number of units
Practical class	Classroom equipped for showing presentations (projector, screen, computer)	1

8. FUND OF THE COURSE EVALUATING TOOLS

Described in a separate document

Ministry of Science and Higher Education of the Russian Federation
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FUND OF ESTIMATING TOOLS

**For students' midterm assessment in the discipline
Innovative economy and technological entrepreneurship
*Supplement to the Academic Course Working Program***

Training program	21.03.01 Oil and Gas Engineering
Direction (specialization) of educational program	Oil and Gas Engineering
Graduate qualification	Bachelor's degree
Graduate academic chair	Oil and Gas Technology
Form of study	Full-time studies
Year (-s): 3	Semester (-s): 5, 6

Workload:

in credits: 6 CU

in hours: 216 h

The form of midterm assessment:

Test 5, 6 semesters

Fund of estimating tools for midterm assessment of students' learning the subject "Innovative economy and technological entrepreneurship" is the part (supplement) to the academic course working program. Fund of estimating tools for midterm assessment of students' learning the discipline has been developed in accordance with the general part of the fund of estimating tools for midterm assessment of the basic educational program which determines the system of the midterm assessment results and criteria of putting marks. Fund of estimating tools for midterm assessment of students' learning the subject determines the forms and procedures of monitoring results and midterm assessment of the subject leaning by the students.

1. LIST OF CONTROLLED RESULTS OF STUDYING DISCIPLINE, OBJECTS OF ASSESSMENT AND FORMS OF CONTROL

According to the Academic Course Working Program mastering course content is planned during two semesters (the fifth and sixth semesters of curriculum) and is divided into four educational modules. Classroom activities, lectures and practical work as well as students' self-work are provided for every module. In the frames of mastering course content such competences as *to know, to be able, to master* pointed out in the ACWP are formed. These competences act as the controlled results of learning the discipline "Innovative economy and technological entrepreneurship" (Table 1.1).

Monitoring of the acquired knowledge, abilities and skills is made in the frames of continuous assessment, progress check and formative assessment in the process of studying theoretical material, reports on practical works and during examination. Types of control is given in Table 1.1

Table 1.1 – List of controlled results of learning the discipline

Controlled results of learning the discipline (KAS)	Type of control					
	Continuous assessment		Progress check		Formative assessment	
	D	AC	LWR/PWR	T/CW	Test	Grading test
1	2	3	4	5	6	7
Acquired knowledge						
K.1 to know how to search, to make critical analysis and synthesis of industry technical and economic information for feasibility study aimed at solution of the given professional tasks	D1 D2			CW1 CW2	TQ	
K.2 to know economic, managerial and market approaches to the problems statement aimed at the achievement of the given target, possesses economic knowledge in choice of optimal ways of their solution; realizes the basic principles of economy operation as well as the economic development	D3 D4			CW3 CW4		TQ

1	2	3	4	5	6	7
Acquired abilities						
A.1 to be able to apply systemic approach on the basis of search, critical analysis and synthesis of industry technical and economic information aimed at solution of science-oriented problems of professional field			PWR 1-14	CW1 CW2	CT	
A.2 to be able to choose economically optimal ways of solution of science-oriented tasks in professional field aimed at achievement of the given target; uses the methods of individual economic and financial planning aimed at achievement of the current and long-term financial goals in the current market environment			PWR 1-14	CW3 CW4		CT
Mastered skills						
S.1 To master the skills of search, synthesis and critical analysis of technical and economic information in his professional field; is a master of systemic approach aimed at solution of the given tasks at an industrial enterprise from an economic point of view			PWR 1-14		CT	
S.2 To master the skills of determining economically justified scope of professional tasks in the frames of the given target aimed at commercialization of innovations; the skills of the choice of economically optimal ways of their solution considering the current legal regulations and available resources and market conditions as well; uses financial instruments for managing personal finances (personal budget), controls personal economic financial risks			PWR 1-14			CT

D – topic discussion; AC – colloquium (discussion of theoretical material, academic conference); CT – case-task (individual task); LWR – report on laboratory work; PWR – report on practical work; T/CW – progress check (control work); TQ – theoretical question; PT – practical task; CT – complex task of grading test.

Final assessment of the learned discipline results is the midterm assessment which is made in the form of test taking into consideration the results of the running and progress check.

2. TYPES OF CONTROL, STANDARD CONTROL TASKS AND SCALES OF LEARNING RESULTS ASSESSMENT

Continuous assessment of the academic performance is aimed at maximum effectiveness of the educational process, at monitoring students' specified competencies formation process, at increase of learning motivation and provides the assessment of mastering the discipline. In accordance with the regulations concerning the continuous assessment of the academic performance and midterm assessment of students taught by the educational programs of Higher education –

programs of the Bachelor's Course, Specialists' and Master's Course the next types of students' academic performance continuous assessment and its periodicity is stipulated in PNRPU:

- acceptance test, check of the student's original preparedness and his correspondence with the demands for the given discipline learning;
- continuous assessment of mastering the material (the level of mastering the component "to know" defined by the competence) at every group studies and monitoring of lectures attendance;
- interim and progress check of students' mastering the components "to know" and "to be able" of the defined competences by computer-based or written testing, control discussions, control works (individual home tasks), reports on laboratory works, reviews, essays, etc.

Discipline progress check is conducted on the next week after learning the discipline module, while the interim control is made at every monitoring during the discipline module study;

- interim assessment, summarizing of the current students' performance at least once a semester in all disciplines for every training program (specialty), course, group;
- retained knowledge control.

2.1. CONTINUOUS ASSESSMENT OF EDUCATION

Continuous assessment of learning is made in the form of discussion or selective recitation on every topic. According to the four-point system the results of assessment are put into the teachers' note-book and are considered in the form of integral marks in the process of the midterm assessment.

2.2. PROGRESS CHECK

For the complex assessment of the acquired knowledge, abilities and skills (Table 1.1) progress check is carried out in the form of report on practical works and midterm control works (after learning every discipline module).

2.2.1. Presentation of practical work

It is planned 14 reports on practical works all in all. Standard topics of practical work are given in ACWP.

Presentation of practical work is made by the student individually or by the group of students. Standard scale and criteria of assessment are given in the general part of FET of the educational program.

2.2.2. Midterm control work

According to ACWP 4 midterm control works (CW) is planned to be realized after learning the educational modules of the discipline by the students.

The first CW is realized with respect to the module 1 “Rationing and evaluating the efficiency of using resources of an industrial enterprise”, the second CW – with respect to the module 2 “Fundamentals of economic analysis in an industrial enterprise”. the third CW – with respect to the module 3 “Planning of economic activity at an industrial enterprise and technological entrepreneurship”. the fourth CW – with respect to the module 4 “Industrial enterprise management”.

Standard tasks of the first CW:

1. Technological and economic trends
2. Team building and development

Standard tasks of the second CW:

1. Consumer research
2. Market analysis and assessment

Standard tasks of the third CW:

1. Innovative ecosystem and support innovation activities
2. Fundraising instruments
3. Assessment of investment attractiveness the project

Standard tasks of the fourth CW:

1. Creation and development of a startup
2. Product development
3. Market launch

Standard scale and criteria of the results of the midterm control work assessment are given in the general part of FET of the educational program.

2.3. FULFILLMENT OF THE COMPLEX INDIVIDUAL SELF-WORK TASK

Individual complex tasks for the students are used for assessment of their skills and abilities acquired in the process of learning the discipline in which the course project or course paper is not stipulated.

Standard scale and criteria of assessment of the individual complex task presentation are given in the general part of FET of the educational program.

2.4. MIDTERM ASSESSMENT (FINAL CONTROL)

Admission for midterm assessment is made according to the results of continuous assessment and progress check. Preconditions for admittance are successful presentation of all practical works and positive integral estimation with respect to the results of continuous assessment and progress check.

2.4.1. Midterm assessment procedure without additional evaluation testing

Midterm assessment is made in the form of a test. Credit on the discipline is based on the results of the previously fulfilled by the student individual tasks on the given discipline.

Criteria of putting the final mark for the components of competences in the process of midterm assessment made in the form of test are given in the general part of FET of the educational program.

2.4.2. Midterm assessment procedure followed by evaluation testing

In definite cases (for example, in case of re-attestation of the discipline) midterm assessment in the form of the test on this discipline can be made as the ticket-based evaluation test. Every ticket includes theoretical questions(TQ) aimed at control of the acquired knowledge, practical tasks (PT) aimed at mastered abilities, and complex tasks (CT) aimed at control of the acquired skills of all declared competences.

The ticket is formed so that the included questions and practical tasks could estimate the level of maturity of **all** declared competences.

2.4.2.1. Standard questions and tasks the discipline testing

Standard questions for the acquired knowledge control:

1. Principles of organization, management and evaluation innovative and entrepreneurial activities
2. The basics commercialization innovation and development high-tech business
3. Basic theories functioning innovative economy and technological entrepreneurship
4. Key elements innovative ecosystems and measures supporting innovative activities

Standard questions and practical tasks for the mastered abilities control:

1. Market analysis, consumer behavior and competitive environment plan and design commercialization results intellectual activities in the form startups
2. Assess efficiency innovative activities

Standard complex tasks for the acquired skills control:

1. How to work in the commercialization market high tech.
2. Working with tools development of business models and business plans.

2.4.2.2. Scales of test assessment of educational achievements

Evaluation of discipline achievements in the form of maturity level of the components *to know, to be able, to master* of the declared competences is made according to the four-point assessment scale.

Standard scale and criteria of estimating educational achievements in the process of testing for the components *to know, to be able, to master* are given in the general part of FET of educational program.

3. ASSESSMENT CRITERIA FOR COMPONENTS AND COMPETENCES LEVEL OF MATURITY

3.1. ASSESSMENT OF COMPETENCES COMPONENTS LEVEL OF MATURITY

While estimating the level of competences maturity by selective control in the process of testing it is considered that *the mark obtained for the components of the examined competence is combined with the corresponding component of all competences formed in the frames of the given academic course.*

General assessment of maturity level of all competences is made by aggregation of marks obtained by the student for each component of the formed competences taking into account the results of continuous assessment and progress check in the form of integral mark according to the four-point scale. All control results are put into the assessment sheet by the teacher according to the results of midterm attestation.

The form of the assessment sheet and requirements for its completion are given in the general part of FET of the educational program.

While making the final assessment of the midterm attestation in the form of test standard criteria given in the general part of FET of the educational program are used.