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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

FEDERAL STATE AUTONOMOUS EDUCATIONAL INSTITUTION OF HIGHER EDUCATION

"MOSCOW POLYTECHNIC UNIVERSITY"
(MOSCOW POLYTECHNIC UNIVERSITY)

Faculty of Economics and Management

APPROVED BY
FEU Dean
_____ /A. V. Nazarenko/
«27» February 2025

WORKING PROGRAM OF THE DISCIPLINE

«Fundamentals of technological entrepreneurship»

Direction of training/specialty
38.03.01 Economy

Profile/specialization
International business and foreign economic

Qualification
bachelor

Forms of study
full-time

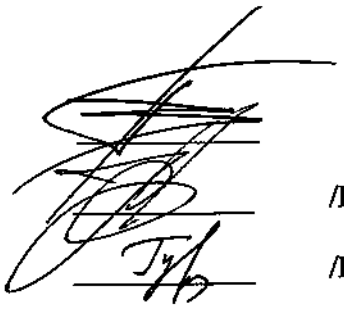
Moscow, 2025

Программу составили:

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1 List of planned learning outcomes for the discipline, correlated with the planned learning outcomes for the educational program

Real program educational disciplines "Basics technological entrepreneurship" establishes the necessary requirements for the knowledge and skills of students in working in a team, including for effective integration into a project team, meeting project deadlines and obtaining the required results.

The program is designed for the training direction 38.03.01 "Economics", profile "Economics of enterprises and organizations" in accordance with:

- Federal state educational standards;
- Higher education programs;
- The working curricula for the start of training in 2023. **Objectives of the discipline**

The purpose of mastering the discipline "Fundamentals of Technological Entrepreneurship" is to develop students' theoretical knowledge and practical skills in the field of economics, technological entrepreneurship and management of innovative projects. Studying and mastering the theoretical foundations and practical skills in the field of technological entrepreneurship forms students' ideas about project activities (from the inception of an idea to the implementation of a project) as an integral system, all elements of which are interdependent. Possession of theoretical foundations and practical skills in the field of technological entrepreneurship is necessary for the successful development and implementation of innovative technologies that determine industrial development and management, the creation and implementation of innovative projects, professional personal growth and self-development, creative solutions to current and strategic management problems: from personnel management to the development of high-tech technologies.

Objectives of studying the discipline The main objectives of studying the discipline:

- studyingthe main theories of the functioning of the innovative economy and technological entrepreneurship, principles of organization, management and evaluation of innovative entrepreneurial activities;

- study of measures of state support for innovation and development innovation ecosystem;

- study of the fundamentals of commercialization of innovations and development of high-tech business;

- formation and development of theoretical knowledge and practical skills in the field planning and designing the commercialization of the results of intellectual activity in the form of a startup, commercial contract, or licensing agreement;

- selection of a business model and development of a business plan;

- market analysis and sales forecasting, consumer behavior analysis, conducting assessment of the effectiveness of innovative activities, analysis of the risks of the organization’s development;

- study of working techniques in the market of commercialization of high technologies with using Product development and Customer development models;

- use of lean startup technologies (lean) and a flexible approach to management (agile), technologies for developing a financial model of a project;

- study of methods for conducting negotiations with investors and public presentations projects (pitches).

Training in the discipline "Fundamentals of Technological Entrepreneurship" is aimed at developing the following competencies in students:

Code and name competencies	Indicators of Competence Achievement
PC-4. Capable of carrying out technical and economic justification of design solutions and technical development task radio engineering system from the point of view of technical-economic indicators.	IPC-4.1 Uses methodological techniques for technical and economic justification of design solutions; IPC-4.2 Carries out financial and economic planning of an engineering project; IPK-4.3. Develops technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators.

2 The place of the discipline in the structure of the educational program

The discipline belongs to the part formed by the participants of educational relations of block B1 "Disciplines (modules)". The discipline belongs to the part formed by the participants of educational relations of block B1 "Disciplines (modules)" - B1.2 "Part formed by the participants of educational relations".

The discipline "Fundamentals of Technological Entrepreneurship" is studied in the 4th semester of study in the field of training 11.03.01 "Radio Engineering", profile "Economics of Enterprises and Organizations".

The discipline is directly related to the following disciplines and practices OOP:

Introduction to project activities;
Jurisprudence;
Project activities;
Project management;
Economy;

3 Structure and content of the discipline

General labor intensity (volume) disciplines "Basics technological "Entrepreneurship" is worth 2 credits.

The volume of the discipline by types of classes (in hours) is 72 hours.

The discipline is taught in full-time and part-time forms of study.

Type of midterm assessment (form of control): credit.

3.1. Types of academic work and labor intensity

(by form of education)

Type of academic work	Total hours	Semester 4
3.1.1 Full-time education		
Classroom lessons (total)	**36**	**36**
Including:	-	-
Lectures	-	-
Practical classes (PZ)	36	36
Seminars (C)	-	-
Laboratory work (LW)	-	-
Independent work (total)	**36**	**36**
Including:	-	-
Preparation for practical classes	36	36
Type of intermediate assessment – credit	-	-
Total labor intensity hours / credit unit	**72/2**	**72/2**
3.1.2 Part-time and part-time education		
Type of academic work	**Total hours**	**Semester 4**
Classroom lessons (total)	**18**	**18**
Including:	-	-
Lectures	-	-
Practical classes (PZ)	18	18
Seminars (C)	-	-
Laboratory work (LW)	-	-
Independent work (total)	**54**	**54**
Including:	-	-
Preparation for practical classes	54	54
Type of intermediate assessment – credit	-	-
Total labor intensity hours / credit unit	**72/2**	**72/2**

3.2 Thematic plan for studying the discipline

(by form of education)

3.2.1 Full-time education

No. p/p	Sections/Topics disciplines	Labor intensity, hour					
		Total	Classroom work				Samostoyatelinya works A
			Lekts and	Seminarskie/ practical eskie classes	Laborate rnye busy tia	Practical itcheska I prep ovka	
1	Topic 1. Introduction to innovative development	6	-	2	-	-	4
2	Topic 2. Team formation and development	4	-	2	-	-	2
3	Topic 3. Business idea, business model, business plan	6	-	4	-	-	2
4	Topic 4. Marketing. Market assessment.	4	-	2	-	-	2
5	Topic 5. Product development. Product development	4	-	2	-	-	2
6	Topic 6. Customer development. Bringing a product to market	4	-	2	-	-	2
7	Topic 7. Intangible assets and intellectual property protection	4	-	2	-	-	2
8	Topic 8. Management interested parties	4	-	2	-	-	2
9	Topic 9. Creation and development of a startup	4	-	2	-	-	2
10	Topic 10. Project life cycle management	4	-	2	-	-	2
11	Topic 11. Tools attracting financing	4	-	2	-	-	2
12	Topic 12. Evaluation of investment attractiveness of the project	4	-	2	-	-	2
13	Topic 13. Project risks	4	-	2	-	-	2
14	Topic 14. Project presentation	4	-	2	-	-	2
15	Topic 15. Innovative ecosystem	4	-	2	-	-	2
16	Topic 16. State innovation policy	4	-	2	-	-	2
17	Topic 17. Final presentation of the group project (pitch session)	4	-	2	-	-	2
	Credit						
	Total	**72**		**36**			**36**

3.2.2 Part-time and part-time education

No. p/p	Sections/Topics disciplines	Labor intensity, hour					
		Total	Classroom work				Samostoyatelnaya works
			Lekts and	Seminarskie/ practical eskie classes	Laboratornye busytia	Practical itcheska I prepovka	
1	Topic 1. Introduction to innovative development	6	-	1	-	-	3
2	Topic 2. Team formation and development	4	-	1	-	-	3
3	Topic 3. Business idea, business model, business plan	6	-	2	-	-	4
4	Topic 4. Marketing. Market assessment.	4	-	1	-	-	4
5	Topic 5. Product development. Product development	4	-	1	-	-	3
6	Topic 6. Customer development. Bringing a product to market	4	-	1	-	-	3
7	Topic 7. Intangible assets and security intellectual property	4	-	1	-	-	3
8	Topic 8. Management interested parties	4	-	1	-	-	3
9	Topic 9. Creation and development of a startup	4	-	1	-	-	3
10	Topic 10. Project life cycle management	4	-	1	-	-	3
11	Topic 11. Tools attracting financing	4	-	1	-	-	3
12	Topic 12. Evaluation of investment attractiveness of the project	4	-	1	-	-	4
13	Topic 13. Project risks	4	-	1	-	-	3
14	Topic 14. Project presentation	4	-	1	-	-	3
15	Topic 15. Innovative ecosystem	4	-	1	-	-	3
16	Topic 16. State innovation policy	4	-	1	-	-	3
17	Topic 17. Final presentation of the group project (pitch session)	4	-	1	-	-	3
	Credit						
	Total	**72**		**18**			**54**

3.3 Contents of the discipline

Topic 1. Introduction to innovative development

The essence and properties of innovations; classification of innovations; innovation process and innovative activity; innovative entrepreneurship; basic innovations and technological structures; main stages of development of the theory of innovation; models of the innovation process: linear, model of market demand pressure, interactive

model; hypotheses of the innovation process: “technological push” (from science to the market), “pressure of market demand” (from market needs to science), interactive model (a dual model that combines the two previous approaches); ways of introducing innovations to the market: the “closed innovation” paradigm, the “open innovation” model; compliance of the business model with the innovation process.

Topic 2. Team formation and development

The concept of an entrepreneurial team; team effectiveness; team leadership; team motivation; distribution of team roles and functions; team development; maintaining team spirit; taking into account psychological characteristics of an individual; team building technologies.

Topic 3. Topic 3. Business idea, business model, business plan

Contents of business idea generation processes; algorithm for the creative birth of a business idea with its subsequent development into a system of solutions (business model); basic provisions for the creation and application of business models: concept and types of business models, key stages of business model formation; mechanism for choosing a business model; functional blocks of a business model; concept of value proposition; transition from a business model to a business plan.

Topic 4. Marketing. Market assessment

Specifics of marketing research in the field of innovation; methods and approaches to market assessment in different industries; criteria for assessing the attractiveness of a segment; marketing research tools: algorithms, research methods and methods of collecting information; features of marketing high-tech startups; features of sales of innovative products.

Topic 5. Product development. Product development

Product life cycle concept; main approaches to product development – waterfall method (cascade method) and agile development method; theory of inventive problem solving; theory of constraints; process of improving characteristics of existing types of products; development of new types of products; technical support of the project of creation of a new product (technology) from pre-project development to design, creation and use; tools of the modern process of Product development: analysis of the competitive environment, technical audit, development of technical and economic justification, technical documentation, control programs.

Topic 6. Customer development. Bringing a product to market

Fundamentals of the concept of Customer development, according to S. Blank and B. Dorf; components of Customer development: identifying consumers, verifying consumers, expanding the customer base, building a company; studying the needs and requests of consumers; methods of modeling consumer needs; factors of consumer behavior; techniques for attracting consumer attention; evaluating the effectiveness of events and optimizing the marketing activities of the enterprise; specifics of the behavior of individual and corporate consumers.

Topic 7. Intangible assets and intellectual property protection The concept of intellectual property, its main legal properties and protection system, the concept and content of intellectual rights, their relationship with the concept of intangible assets; IP strategy of an innovative project and its components; differences

between the two main modes of legal protection of the results of intellectual activity – copyright and patent law; patenting, patenting systems and procedures in Russia, abroad, and internationally; the concepts of “invention formula (utility model)”, “priority”, “state of the art”, “patent search”, “patent purity”; existing legal methods of acquiring and commercializing intellectual property; the main features of production secrets (know-how) and means of individualization of legal entities, goods, works, services, and enterprises.

Topic 8. Stakeholder Management

The concept of "stakeholder", types and roles of project stakeholders. Methods of classification, determining the significance of a stakeholder, drawing up a hierarchy. Methods and ways of interacting with stakeholders. Drawing up a stakeholder map.

Topic 9. Creation and development of a startup

Definition and nature of a startup; the lean startup methodology; the SPACE model – a model reflecting the space and orbit of the business “flight”; HADI cycle – a method of cyclical process of hypothesis testing. Stages of startup development; prototype, product compliance with target market expectations; growth dynamics; growth and strengthening of positions; scaling and market capture; public offering of shares.

Topic 10. Project life cycle management

Qualitative characteristics of the project life cycle, its phases and stages, place in project management. Project cycle models, their types, distinctive features. Initiation, birth, development, implementation and completion of the project. Typical requirements for startup management at different stages. Change in management methods depending on the stage.

Topic 11. Instruments for attracting financing

Sources of project financing: budget and extra-budgetary funds, state development institutions, companies, individual entrepreneurs, private, institutional and foreign investors, credit and financial organizations, scientific and educational institutions; financing instruments: investments of business angels and venture funds, grants, subsidies; selection and justification of sources of financing for an innovative project; financial modeling of the project; technologies for negotiating with investors on project financing.

Topic 12. Evaluation of investment attractiveness of the project

Static and dynamic methods for assessing the economic efficiency of innovative projects; principles for assessing the efficiency of projects; net profit of an innovative project as a criterion for economic efficiency; comparative analysis of various types of assessment: commercial, public, participation in the project; a system of metrics for innovative projects taking into account the inapplicability of economic efficiency criteria at early stages of project development (before reaching stable sales); criteria for investment readiness of a project for venture investments and their difference from criteria for direct investments.

Topic 13. Project risks

Risks arising during the implementation of an innovative project: the probability of loss of competitiveness at individual stages of risk management; risk identification; qualitative and quantitative analysis of the probability of the possible impact of risk on the project; application of methods and means to reduce risks and consequences of risk events;

project risk monitoring; project risk assessment methods: expert methods, probabilistic analysis, analog method, project sensitivity analysis, “decision tree” method (at the project development stage); insurance, diversification; option; system for assessing basic risks of an innovative project, planning and implementation of counteraction to project risks in the event of a significant change in the situation.

Topic 14. Project presentation

Three types of presentations: presentation of the project to the investor (presentation on investment session, short pitch, elevator pitch); presentation of a solution during a problem interview (presentation for technical staff, presentation for budget holders); sales presentation (presentation of a product to a potential buyer); features of presentations, their structure, factors influencing the effectiveness of presentations.

Topic 15. Innovative ecosystem

The concept and structure of the innovation environment: scientific and production environment (universities, institutes for innovation development, innovative business, venture capital, innovative infrastructure: technology parks, business incubators, engineering centers); institutional environment (laws, norms, traditions, rules of conduct, political and cultural characteristics of subjects of innovative activity); scheme for building national innovation systems; innovative infrastructure of Russia.

Topic 16. State innovation policy

The essence of state innovation policy and stages of its transformation; modern instruments of innovation policy; strategy of innovative development until 2020; national reports on innovations in Russia 2015, 2016; state programs that have a significant impact on the development of the national innovation system; programs of innovative development of companies with state participation; state development institutions; universities as a key factor in innovative development; support for innovation in large companies; monitoring system of the innovation system.

Topic 17. Final presentation of the group project (pitch session) Preparation of presentations for various audiences (competition jury, investors, buyers); development of a presentation preparation algorithm, structure; placement of accents; "hooks" for attracting and holding the audience's attention; technologies for preparing a speech. Presentation of projects to experts during a pitch session.

3.4 Topics of seminars/practical and laboratory classes

3.4.1 Seminars/Practical Classes

3.4.1.1 Seminar/practical lesson 1 on topic 1.**Introduction to Innovation development**

Introducing the teacher, checking the compliance of the study group and the number of students in it. Forming final lists of students with e-mail addresses. Discussion:

- the format of individual and collective educational assignments;

- presentations of technologies for students. Explanation of the rules of work of student teams on group projects during the implementation of the course “Fundamentals of Technological Entrepreneurship”;

- organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. Discussion of the question "Why am I interested in this technology?"

3.4.1.2 Seminar/practical lesson 2 on topic 2.**Team building and development** Discussion of the concept of "Business game". Conducting a business game: "Building teams". Preparation of a justification for the distribution of functions in student teams, taking into account the personal characteristics of the participants. Formation of teams. Distribution of projects between teams. Distribution of functions in teams.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Selection of the topic of the test.

3.4.1.3 Seminar/practical lesson 3 to topic 3.**Business idea, business model, business plan**

Discussion of the business idea, business model and business plan of the project. Study of the main requirements for the business plan. Case: "Building a business model based on the template of A. Osterwalder and I. Penier. Description of the selected technology and business idea of the group project. Creation of a business model of the project based on the template of A. Osterwalder and I. Penier.

Organization and implementation of ongoing monitoring of students’ knowledge in the form of a survey.

3.4.1.4 Seminar/practical lesson 4 to topic 4.**Marketing. Market assessment** Discussion of the term "Marketing", case: "Assessment of the electric sneaker market". Marketing analysis of the group project market. Description of macro- and microenvironment factors. Assessment of the size of the target segment.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Checking and discussing the submitted tests.

3.4.1.5 Seminar/practical lesson 5 to topic 5.**Product development. Product development**

Discussion of the concept of Product development. Business game: Product development within the framework group project chosen by the students. Discussion of the presentation on the topic "Product development methods applied to your project".

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Selection of the topic of the test.

3.4.1.6 Seminar/practical lesson 6 to topic 6.**Customer development. Bringing a product to market**

Discussion of the concept of Customer development. Case: “Bringing products to market in categories of OMD". Identification of target segments of technology consumers. Modeling the needs of target consumers. Analysis of barriers to satisfying needs.

Organization and implementation of ongoing monitoring of students’ knowledge in the form of a survey.

3.4.1.7 Seminar/practical lesson 7 to topic 7.**Intangible assets and security intellectual property**

Discussion of the concept of "intellectual property". Business game: "Development of an IP strategy for an innovative project" using the example of a group project chosen by the students. Discussion of writing an IP strategy for an innovative project chosen by the students based on the results of the business game.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Checking and discussing the submitted tests.

3.4.1.8 Seminar/practical lesson 8 to topic 8.**Stakeholder Management parties**

Discussion of the concept of "stakeholder".Case: "Thesis Defense". Mapping stakeholders.

Organization and implementation of ongoing monitoring of students' knowledge in the form of a survey.

3.4.1.9 Seminar/practical lesson 9 to topic 9.**Startup creation and development** Discussion of startup methods. Business game: "Creation and development of a startup". Analysis the pros and cons of creating a startup based on the chosen technology.

Organization and implementation of ongoing monitoring of students' knowledge in the form of a survey.

3.4.1.10 Seminar/practical lesson 10 to topic 10.**Lifecycle Management project**

Discussion of the concept of "project life cycle". Business game: "Formation life cycle of a startup." Discussion of searching for thematic materials in periodical literature.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Selection of the topic of the test.

3.4.1.11 Seminar/practical lesson 11 to topic 11.**Attraction tools financing**

Discussion of project financing instruments. Business game: "Choice and justification of sources of financing for an innovative project". Formation of a financial model for a group project.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Checking and discussing the submitted tests.

3.4.1.12 Seminar/practical lesson 12 to topic 12.**Investment assessment attractiveness of the project**

Discussion of the investment attractiveness of the project. Business game "Justification of the economic feasibility of project implementation". Evaluation of the investment attractiveness of a group project.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 12.

3.4.1.13 Seminar/practical lesson 13 to topic 13.**Project risks**

Discussion of risks arising during the implementation of an innovative project. Case: "Risk assessment of innovative developments in the field of metallurgy". Analysis of project risks. Definition of risk management procedures necessary for the project.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 13. Selection of the topic of the test.

3.4.1.14 Seminar/practical session 14.**Project presentation**

Discussion of project presentation types. Business game: "Presentation of projects to investors". Discussion of preparation of a group project presentation.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 14.

3.4.1.15 Seminar/practical session 15.**Innovative ecosystem** Discussion of the concept of "innovative environment". Case: "Innovative ecosystem of the university". Discussion of the analysis of the innovative environment of the university, city and region. Evaluation of the innovative potential of a group project in the context of the innovative environment.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 15. Checking and discussing the submitted tests.

3.4.1.16 Seminar/practical session 16.**State innovation policy** Discussion of the concept of "state innovation policy". Case: "State program "Digital Economy". Discussion of the analysis of the group project's compliance with the state priorities within the framework of innovation policy and the markets of the National Technology Initiative.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 16.

3.4.1.17 Seminar/practical session 17.**Final presentation of the group project (pitch session)**

Discussion of the concept of "presentation for different audiences". Presentation of projects to experts during a pitch session at the end of the course.

Organization and implementation of current monitoring of students' knowledge in the form of a survey. Lesson 17. Summing up. Liquidation of students' debts. Midterm assessment.

3.4.2 Laboratory exercises

(The topics of the classes are indicated with a list of laboratory work) Laboratory classes are not planned.

3.5 Topics of course projects (course papers)

Course projects (coursework) are not planned.

4 Educational, methodological and information support

4.1 Regulatory documents and GOSTs

Regulatory documents and GOSTs are not used when studying the discipline. Students can use industry regulatory documents and GOSTs when studying the discipline, if necessary.

4.2 Main literature

1. Steve Blank, Startup: a handbook for the founder // M.: Alpina Publisher, 2015 - 616 p.
2. Alexander Osterwalder, Yves Pigneur, Building Business Models // M.: Alpina Publisher, 2015. – 288 p.
3. Economics of Innovation: a textbook // Moscow: Economic Faculty, Lomonosov Moscow State University, 2016. — 310 s.

4.3 Further reading

1. Eric Ries, Business from Scratch // M.: Alpina Publisher, 2015. – 250 p.
2. Noam Wasserman, The Founder’s Guide to Success // Moscow: Alpina Publisher, 2014.
3. Clayton Christensen, The Innovator’s Dilemma // Moscow: Alpina Publisher, 2015. – 290 p.

4. Genrikh Altshuler, Find an idea: an introduction to TRIZ - the theory of inventive problem solving // M.: Alpina Publisher, 2017. - 404 p.
5. Lawrence Leach, On Time and on Budget // Moscow: Alpina Publisher, 2015.
6. Bill Kates, Tell Me About Me: Proven Techniques for Attracting New Clients // Moscow: Alpina Publisher, 2011.
7. Seth Godin, Try It and It Will Work // Moscow: Alpina Publisher, 2011.
8. Gassman O., Frankenberger K., Schick M. Business models. 55 best templates. - M.: Alpina Publisher, 2017.
9. Goldratt E., Cox J. The Goal. The Process of Continuous Improvement. - M.: Popurri, 2016. - 400 p.
10. Greengard S. Internet of Things. The Future is Here. — M.: Alpina Publisher, 2016. — 188 p.

11. Franks B. Revolution in analytics. How to improve your business in the era of Big Data with the help of operational analytics. - M.: Alpina Publisher, 2017. - 320 p.
12. Boer F.P. Technology Cost Assessment. Business and Finance Issues in the World of Research and Development. 2007. — 432 p.

4.4 Electronic educational resources

1. Mospolitekh digital education platform -https://lms.mospolytech.ru/
2. Personal account of the student (portfolio) (the entrance to the personal account is located on the official website of the University and includes the student's portfolio, electronic statements, student rating and provides:

- recording the progress of the educational process, the results of the midterm assessment and the results of mastering educational programs by students,
- formation of an electronic portfolio of the student, including the preservation of works student, reviews and assessments of these works;

3. Access to the information and telecommunications network "Internet"
4. Electronic libraries, including electronic catalogues, full-text documents and providing access to educational and methodological materials
5. Antiplagiat System - https://www.antiplagiat.ru/
6. The system "POLYTECH systems" provides information, documentation automated support of the educational process.
7. Educational and methodological materials in electronic form, presented on the Mospolitekh website in the section "Library. Electronic resources" http://lib.mami.ru/lib/content/elektronnyy-katalog
8. Additional educational, methodological and informational materials on the website: www.intuit.ru - National Open University
9. Additional educational, methodological and informational materials on the website: www.elibrary.ru - Scientific electronic library

4.5 Licensed and freely distributed software security

1. Microsoft Office suite programs (Word, Excel, PowerPoint)

4.6 Modern professional databases and information reference systems

1. SPS "ConsultantPlus: Non-commercial Internet version". - URL: http:// www.consultant.ru/online/ (date accessed: 16.02.2023). –Access mode: free.

5 Logistics

1. Auditorium for practical classes.
2. Interactive whiteboard.
3. Computer class with Internet access.
4. Audience for group and individual consultations, ongoing monitoring and midterm assessment.
5. Audience for independent work.
6. Library, reading room.

6 Methodological recommendations

6.1 Methodological recommendations for the teacher on the organization training

This section of this work program is intended for beginning teachers and practicing specialists who do not have teaching experience.

The discipline "Fundamentals of Technological Entrepreneurship" is a discipline of the part of the RUP formed by the participants of educational relations of block B1 "Disciplines (modules)" - B1.2 "Part formed by the participants of educational relations" and provides the initial stage of formation of competence in the direction of training 38.03.01 "Economics" profile "Economics of enterprises and organizations".

In the process of mastering the course topics, the teacher should pay primary attention to issues of developing an understanding of the norms of project activities.

When studying the discipline, it is necessary to ensure that students understand the essence of project activities and practical mastery of the methodology for developing an innovative idea to the level of a scalable business.

The theoretical study of the main issues of the discipline sections should be reinforced by active practical work within the framework of the discipline “Fundamentals of Technological Entrepreneurship”.

To activate the educational process when studying a discipline, it is effective to use current monitoring of students' knowledge in the form of a survey, as well as listening to reports on the topic of the lesson.

In design conditions educational systems on principles the competence-based approach has resulted in a conceptual change in the role of the teacher, who, along with the traditional role of the knowledge carrier, performs the function of the organizer of the student's research work, a consultant in the procedures for selecting, processing and interpreting information necessary for practical action and further development, which must be taken into account when conducting practical classes in the discipline "Fundamentals of Technological Entrepreneurship".

The detailed content of individual sections of the discipline “Fundamentals of Technological Entrepreneurship” is considered in paragraph 3.3 of the work program.

The topics of practical classes in sections of the discipline and types of classes are reflected in paragraph 3.4 of the work program. Conducting practical classes is aimed at:

- study of specialized literature and popular periodicals;
- specialized information sites;
- formation of a scientifically based understanding of the features of technological entrepreneurship of modern students;
- setting goals, defining tasks, planning the expected result when completion of the project.

Section 3.3 specifies the subject content of the discipline. Section 3.4 specifies the seminar/practical and laboratory classes. List of main and additional

literature and news information sites required in the course of teaching the discipline "Fundamentals of Technological Entrepreneurship" is given in paragraph 4 of this work program. The teacher should guide students to use modern scientific literature in preparation for seminars/practical classes in the discipline.

The assessment tools for current monitoring and midterm assessment of students are provided in paragraph 7 of the work program, taking into account the competency-based approach in the process of implementing the educational program.

The assessment of the forms of current control and interim certification includes preparation for the test on the questions proposed in paragraph 7.3.

6.2 Methodological instructions for students on mastering the discipline

Acquiring in-depth knowledge of the discipline is achieved through active independent work of students. It is advisable to use the allocated hours to get acquainted with educational and scientific literature on the problems of the discipline, and to analyze scientific concepts.

The discipline provides for various forms of monitoring the level of achievement by students of the stated indicators of mastery of competencies.

Forms of ongoing control – active work in practical classes, testing.

The form of intermediate control in the discipline is a test during which the level of achievement of the stated indicators of mastery of competencies by students is assessed.

6.2.1 Methodological guidelines for mastering the discipline.

Seminars/practical classes are conducted in accordance with the content of this work program in an offline format. Attendance at seminars/practical classes is mandatory.

Conducting seminars/practical classes By discipline "Basics "technological entrepreneurship" is carried out in the following forms:

- survey on materials reviewed in class and studied independently recommended literature;
- kuysy;
- business games;
- Brief analysis and discussion of issues on the topic of the lesson and answers to questions. Active participation in seminars/practical classes is mandatory.

Preparation for practical classes necessarily includes studying lecture notes and recommended literature for an adequate understanding of the conditions and method of completing the tasks planned by the teacher for a specific practical class.

6.2.2 Methodological guidelines for independent extracurricular work.

Independent work is the main type of work on mastering the theoretical materials of the course and acquiring work skills during time free from compulsory classes. theoretical material and acquiring the required skills within the framework of The goal of independent work is the practical acquisition of competencies by students.

Independent work of the student on mastering the educational material on the academic discipline can be performed in the University library, classrooms, computer labs, and also at home. The content and amount of independent work of the student is determined by the curriculum of the discipline, methodological materials, practical assignments and instructions of the teacher.

Study of primary and secondary literature on the discipline is conducted on a regular basis in the context of each topic to prepare for the midterm assessment on the discipline "Fundamentals of Technological Entrepreneurship". The list of primary and secondary literature on the discipline is given in paragraph 4 of this work program.

Preparation for the practical lesson. Practical classes allow the student to develop creative theoretical thinking, the ability to independently study literature, analyze practice; they teach how to clearly formulate thoughts, conduct discussions, that is, they are of exceptional importance in the development of independent thinking.

Preparation for a practical lesson includes two stages. At the first stage, the student plans his/her independent work, which includes: understanding the task for independent work; selection of primary and additional literature; drawing up a work plan, which defines the main points of the upcoming preparation. Drawing up a plan disciplines and improves organization in work.

The second stage includes direct preparation for the lesson, which begins with studying the main and additional literature, mastering a case or business game on the topic of the practical lesson. Next, you should prepare answers for presentations on all educational issues brought up in the practical lesson, think over examples in order to ensure a close connection between the topic being studied and real life, and complete a test.

When preparing for a presentation during a practical lesson, you should seek help from your teacher if necessary.

Guidelines for preparation for midterm assessment Midterm assessment in the discipline "Fundamentals of Entrepreneurship" in the form of a test is carried out based on the results of completing all types of academic work provided for by the curriculum for this discipline, while taking into account the results of current monitoring of academic performance during the semester.

Only students who have completed all types of academic work stipulated by the work program for the discipline “Fundamentals of Technological Entrepreneurship” (completed tests, passed the midterm assessment) are admitted to the midterm assessment.

The assessment of the degree of achievement of the planned learning outcomes in the discipline is carried out by the teacher conducting the classes in the discipline, based on the sum of points in accordance with Table 1. Based on the results of the midterm assessment in the discipline, a credit/grade is given on a five-point scale, taking into account the compliance with the 100-point and 5-point assessment scales (Table 1) and the compliance of the competency levels with the 5-point scale (Table 2).

Table 1 - Ratio of 100-point and 5-point assessment scales

Scores on a 100-point scale	Scores on a 5-point scale
80-100 points	5 points
60–79 points	4 points
40–59 points	3 points
20–39 points	2 points
0–19 points	1 point

Table 2-Criteria for assessing the level of mastery of competencies

PC-4. Capable of carrying out technical and economic justification of design solutions and technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators.		
Indicator	**Evaluation criteria**	
	Not accepted	**Passed**

IPC-4.1 Uses methodological techniques for technical and economic justification of design solutions IPC-4.2 Carries out financial and economic planning of an engineering project IPK-4.3. Develops technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators.	The student demonstrates indicates the absence of a sign- techniques of technical economic justification Vani design solutions niy; has not mastered financial and economic planning engineering project; not ready to develop technical specifications application for the development of a radio-technical system with from an economic point of view ical indicators	The student demonstrates resonates from sufficient to free level use of the method- methods of technical and economic justification development of design solutions financial and economic matic planning engineering project; development of technical specifications for development radio engineering system from the point of view of technical and economic indicators zateley

The teacher can also use the sample list of questions for the test in the discipline "Fundamentals of Technological Entrepreneurship" to increase the value of the point assessment in accordance with the scale (see paragraph 7.3).

The criteria for assessing the student's response for the purposes of assessing the achievement of the stated indicators of competence development are provided in the FOS for the discipline in paragraph 7 of this work program.

The student is admitted to the midterm assessment in the discipline regardless of the results of the current academic performance monitoring.

6.2.3 Features of the implementation of the discipline for disabled people and persons with with disabilities

Teaching in the discipline "Fundamentals of Technological Entrepreneurship" to disabled people and people with limited health capabilities (hereinafter referred to as PHC) is carried out by a teacher taking into account the characteristics of psychophysical development, individual capabilities and health status of such students.

For students with musculoskeletal disorders and hearing disabilities, lectures and practical classes are supported by multimedia tools and handouts.

For students with visual disabilities, the use of technical means to enhance residual vision is envisaged, and the possibility of developing audio materials is also provided.

In the discipline "Fundamentals of Technological Entrepreneurship", training of disabled people and people with limited health capabilities can be carried out both in the classroom and using an electronic information and educational environment, an educational portal and e-mail.

7 Evaluation Fund

7.1 Methods of monitoring and assessing learning outcomes

Code and name competencies	**Achievement indicators competencies**	**Control methods and assessments**
PC-4. Capable realize	IPC-4.1 Uses methodological techniques of technical	Midterm assessment: credit

Code and name competencies	Achievement indicators competencies	Control methods and assessments
technical-economic justification design solutions and technical task for development radio engineering systems from the point technical point of view economic indicators.	economic justification of design solutions; IPC-4.2 Implements financial and economic planning of an engineering project; IPC-4.3. Develops technical specifications for development of a radio engineering system from the point of view of technical and economic indicators.	Current control: - survey at seminars/ practical classes; - business game; - case.

7.2 Scale and criteria for assessing learning outcomes

7.2.1 Criteria for assessing the answer during the test

(development of competence PC-4, indicators IPC-4.1, IPC-4.2, IPC-4.3) Intermediate assessment of students in the form of a test is carried out based on the results of completing all types of academic work provided for by the curricula for the discipline "Fundamentals of Technological Entrepreneurship", taking into account the results of current monitoring of academic performance during the semester. Assessment of the degree of achievement by students of the planned learning outcomes for the discipline is carried out by the teacher conducting classes on the discipline in accordance with the point scale of assessment.

Based on the results of the midterm assessment for a discipline, a grade of “pass” or “fail” is given.

Rating scale	Description
Passed	All types of educational work provided for by the curriculum have been completed. The student is able to use methodological techniques for the technical and economic justification of design solutions; carry out financial and economic planning of an engineering project; draw up technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators. In this case, minor errors, inaccuracies, difficulties in analytical operations, and the transfer of knowledge and skills to new, non-standard situations may be allowed. Competencies have been developed.
Not credited	One or more types of academic work provided for by the curriculum have not been completed. The student does not demonstrate theoretical knowledge, is unable to use methodological techniques for the technical and economic justification of design solutions; is unable to carry out financial and economic planning of an engineering project; is unable to draw up a technical assignment for the development of a radio engineering system from the point of view of technical and economic indicators and is unable to quickly respond to clarifying questions, experiences

Rating scale	Description
	significant difficulties in operating knowledge and skills when transferring them to new situations. Competencies are not developed.

7.2.2. Criteria for assessing the student's work in practical classes

(formation of competence PC-4, indicators IPC-4.1, IPC-4.2, IPC-4.3)

"5" (excellent):the student actively participated in the discussion of the topic of the practical assignment, provided for by the plan of practical classes; used methodological techniques of technical and economic justification of design solutions; applied financial and economic planning of the engineering project; drew up a technical assignment for the development of a radio engineering system from the point of view of technical and economic indicators. The student answered all test questions clearly and without errors, actively worked in practical classes; completed tests; participated in business games and cases.

"4" (good):the student participated in the discussion of the topic of the practical assignment, provided for by the plan of practical classes; the student, with corrective comments from the teacher, used methodological techniques for the technical and economic justification of design solutions; applied financial and economic planning of the engineering project; drew up a technical assignment for the development of a radio engineering system from the point of view of technical and economic indicators. The student answered all test questions, worked quite actively during practical classes; completed tests; participated in business games and cases, but did not speak.

"3" (satisfactory):the student participated in the discussion of the topic in fragments practical assignment, provided by the plan of practical classes; the student with corrective comments of the teacher used methodological techniques of technical and economic justification of design solutions; compiled a technical assignment for the development of a radio engineering system from the point of view of technical and economic indicators; the student answered some test questions with comments; did not submit completed test papers; did not actively participate in business games and cases.

"2" (unsatisfactory):the student did not participate in the discussion of the issues practical assignments provided for in the practical training plan; the student did not use the methodological techniques for the technical and economic justification of design solutions; did not draw up a technical assignment for the development of a radio engineering system from the point of view of technical and economic indicators; the student answered the test questions with errors or did not answer the test questions; did not complete the tests; did not take part in business games and cases.

7.2.3. Test results evaluation criteria

There is no testing for the Project Management course.

7.3 Evaluation tools

7.3.1 Current control

(formation of competence PC-4, indicators IPC-4.1, IPC-4.2, IPC-4.3)

Sample list of questions for a seminar/practical lesson

1. The project as a way to satisfy the social needs of society.
2. The impact of project-based learning on professional competitiveness.
3. What is a pilot project?
4. What is the role of business planning in project management.

5. Stakeholders as participants in the external environment of project activities.
6. List the main patterns of forming a project team.
7. How do risks influence the project implementation process?
8. How to manage the project life cycle.
9. What is the social effect of the project implementation?
10. How is the Gunn diagram used in project time management?
11. How a project marketing strategy is developed and budget is drawn up.
12. What is the economic effect of the project implementation?
13. The project as a system, its structure and documentation: project map, project passport.
14. Business plan: types, content, sections and characteristics.
15. The project team and the social roles of its participants.
16. Project time constraints, Gantt chart.
17. Acceptable/unacceptable risk indicators and project risk assessment.
18. Evaluation of project effectiveness: modern methods of its calculation.
19. Feasibility study of design solutions and technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators. 20. Methodological techniques for the feasibility study of design solutions.
21. Financial and economic planning of an engineering project.
22. Technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators.

An example of a business game “Team building” as part of a practical lesson: "SYNCHRONOUS"

Time: 5 minutes.

Number of players: any number of people.
Props: not required.
Rules: a simple funny game that will not only cheer up the participants, but also unite the team. You don't even have to get up from your workplace to participate. The host gives each participant a task in turn. For example, sit down. All other players must complete the task in sync with the participant.
The essence of the event is to feel each other and notice non-verbal signs.

Sample case "Marketing research of the market" as part of a practical lesson:

Market research is an analysis conducted to study the potential market size, demand for goods and services in this market, the competitive environment, prices, needs for goods and services that appear in the market. This type of research is designed to help students form a clear understanding of the product sales market, which should become the basis for organizing marketing.

Tasks:

- Determination of market capacity
- Construction of a socio-demographic portrait of the consumer

Methodology:
Quantitative research (survey of potential consumers). Target group – individuals, potential buyers of the product.

Marketing research of product price

Tasks:

- Market segmentation and determination of producer share
- Identifying the role of price in the list of product selection criteria

- Determining the optimal price for the manufacturer of goods
  Methodology:

A complex that includes qualitative (a series of focus groups) and quantitative (questionnaire survey of buyers) research.

Approximate list of tests completed in the form of a paper/essay:

1. Written response to the question: "Why am I interested in this technology?"
2. Preparation of a justification for the distribution of functions in student teams, taking into account the personal characteristics of the participants. Formation of teams. Distribution of projects between teams. Distribution of functions in teams
3. Description of the selected technology and business idea of the group project. Creation of a business model of the project based on the template of A. Osterwalder and I. Penier.
4. Marketing analysis of the group project market. Description of macro- and microenvironment factors. Assessment of the size of the target segment
5. Preparing a presentation on the topic "Product development methods applied to your project"
6. Preparing a presentation on the topic "Product development methods applied to your project"
7. Identification of target segments of technology consumers. Modeling the needs of target consumers. Analysis of barriers to meeting needs
8. Writing an IP strategy for an innovative project chosen by the students
9. Developing the possibility of using the "Licensing" business model in relation to intellectual property in a group project
10. Analysis of the pros and cons of creating a startup based on the chosen technology
11. Estimation of the cost of work and determination of the contract price. Description of project resources. Preparation of a presentation for a commercial customer
12. Formation of a financial model for a group project
13. Evaluation of investment attractiveness of a group project
14. Project risk analysis. Determining the risk management procedures required for the project
15. Preparing a presentation of a group project
16. Analysis of the innovative environment of the university, city and region. Evaluation of the innovative potential of a group project in the context of the innovative environment
17. Analysis of the compliance of the group project with the state priorities within the framework of innovation policy and the markets of the National Technology Initiative
18. Preparing a project presentation to external experts during a pitch session at the end of the course

7.3.2 Interim assessment

Approximate list of questions to be put to the test

1. Concept, goals and objectives of project management.
2. International and Russian project management associations.
3. Relevance of managing innovative projects.
4. Objectives and tasks of project management.
5. Concept, classification and characteristics of an innovative project.
6. Content, participants and environment of the project.
7. International and national project management standards.
8. Project life cycle: phases and stages.
9. Features of project life cycle management.
10. Project concept. Requirements for its content.
11. Project management models and strategies.

12. Strategic project management and its features.
13. Project management functions.
14. Process approach to project management.
15. Principles of effective project management.
16. Sequence of stages of project management.
17. Basic principles of forming a project team
18. Basic patterns of team development
19. Managing communications in a team.
20. Project resource provision: requirements.
21. Project analysis: structure and composition
22. Evaluation and selection of innovative ideas.
23. Criteria for evaluation and selection of projects.
24. Development of the mission, goals and objectives of the project.
25. Rules for constructing a tree of goals.
26. Expertise of innovative projects.
27. Methods of evaluation and selection of innovative projects.
28. Evaluation of the effectiveness of innovative projects.
29. Project planning processes and levels.
30. Parameters and characteristics of design works.
31. Assessment of the social significance of the project.
32. Assessment of the economic significance of the project.