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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"

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"27" февраля 2025

WORKING PROGRAM OF THE DISCIPLINE

"Basics of Technological Entrepreneurship"

Field of study
38.03.02 Management

Educational program (profile)
"Business Process Management"

Qualification (degree)
Bachelor

Form of study
Part-time

Moscow 2025

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1 List of planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program

This program of the academic discipline “Basics of Technological Entrepreneurship” establishes the necessary requirements for the knowledge and skills of students working in a team, including for effective integration into the project team, meeting project deadlines and obtaining the required results.

The program was developed for the training direction 38.03.02 “Management”, profile “Business Process Management” in accordance with:

- Federal State Educational Standards FSES3++;
- Educational programs of higher education;
- Working curricula for 2025 start of preparation.

Goals of the discipline

The goal of mastering the discipline “Basics of Technological Entrepreneurship” is to develop in students a complex of theoretical knowledge and practical skills in the field of economics, technological entrepreneurship and innovation project management. Studying and mastering the theoretical foundations and practical skills in the field of technological entrepreneurship gives students an idea of project activity (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 problems of current and strategic management: starting with personnel management and ending with the development of high technology.

Objectives of studying the discipline

The main objectives of studying the discipline:

- studying the basic theories of the functioning of the innovative economy and technological entrepreneurship, the principles of organization, management and evaluation of innovative entrepreneurial activity;
- studying measures of state support for innovation and the development of the innovation ecosystem;
- studying the basics of commercialization of innovations and development of high-tech business;
- formation and development of theoretical knowledge and practical skills in the field of planning and designing the commercialization of the results of intellectual activity in the form of a startup, commercial contract, license agreement;
- choosing a business model and developing a business plan;
- market analysis and sales forecasting, analysis of consumer behavior, assessment of the effectiveness of innovation activities, analysis of organizational development risks;
- studying techniques for working in the high technology commercialization market using Product development and Customer development models;
- use of lean startup technologies (lean) and flexible management approach (agile), technologies for developing a financial model of the project;
- studying methods for conducting negotiations with investors and public presentations of projects (pitches).

Training in the discipline “Basics of Technological Entrepreneurship” is aimed at developing the following competencies in students:

Code and name of competencies	Indicators of Competency Achievement
UK-2. Able to determine the range of tasks within the framework of the set goal and choose the best ways to solve them, based on current legal norms, available resources and limitations	IUK-2.1. Formulates a set of tasks within the framework of the set goal of the project, the solution of which ensures its achievement IUK-2.2. Determines the connections between the assigned tasks, the main components of the project and the expected results of its implementation IUK-2.3. Selects the optimal methods of planning, distributing areas of responsibility, solving problems, analyzing results, taking into account current legal norms, existing conditions, resources and limitations, possibilities of use

2 Place of discipline in the structure of the educational program

Discipline applies to the part formed by participants in educational relations of cycle B.1.2.23.4 of the module “Projects and project activities”.

The discipline “Basics of Technological Entrepreneurship Management” is studied in the 4th semester of study in the direction of preparation 38.03.02 “Management”, profile “Business Process Management”.

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

Introduction to project activities;
Project activities;
Project management;
Methods of making management decisions;
Entrepreneurship.

3 Structure and content of the discipline

The total labor intensity (volume) of the discipline “Basics of Technological Entrepreneurship” is 2 credit units.

The volume of discipline by type of training (in hours) is 72 hours.

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

Type of intermediate certification (form of control): test.

3.1. Types of educational work and labor intensity

(according to forms of study)

Type of educational work	Total hours	Semester 4
3.1.1 Part-time education		
Type of educational work	**Total hours**	**Semester 4**
Classroom lessons (total)	**18**	**18**
Including:	-	-
Lectures	-	-
Practical exercises (PL)	18	18
Seminars (C)	-	-

Type of educational work	Total hours	Semester
		4
Laboratory work (LR)	-	-
Independent work (total)	**54**	**54**
Including:	-	-
Preparation for practical classes	54	54
Type of intermediate certification - test	-	-
Total labor intensity hour / credit. units	**72/2**	**72/2**

3.2 Thematic plan for studying the discipline

(according to forms of study)

3.2.2 Part-time and part-time education

No. p/p	Sections/topics disciplines	Labor intensity, hour					
		Total	Classroom work				Independent work
			Lectures	Seminars/practical sessions	Laboratory exercises	Practical training	
1	Topic 1. Introduction to innovative development	4	-	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.	5	-	1	-	-	4
5	Topic 5. Product development. Product development	4	-	1	-	-	3
6	Topic 6. Customer development. You are bringing the product to market	4	-	1	-	-	3
7	Topic 7. Intangible assets and protection of intellectual property	4	-	1	-	-	3
8	Topic 8. Stakeholder management	4	-	1	-	-	3
9	Topic 9. Creation and development of a start-up	4	-	1	-	-	3
10	Topic 10. Project life cycle management	4	-	1	-	-	3
eleven	Topic 11. Tools for attracting financing	4	-	1	-	-	3
12	Topic 12. Assessing the investment attractiveness of the project	5	-	1	-	-	4
13	Topic 13. Project risks	4	-	1	-	-	3
14	Topic 14. Project presentation	4	-	1	-	-	3
15	Topic 15. Innovation 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
	Test						

No. p/p	Sections/topics disciplines	Labor intensity, hour					
		Total	Classroom work				Independent work
			Lectures	Seminars/practical sessions	Laboratory exercises	Practical training	
Total		**72**		**18**			**54**

3.3 Contents of the discipline

Topic 1. Introduction to innovative development

The essence and properties of innovation; classification of innovations; innovation process and innovation activity; innovative entrepreneurship; basic innovations and technological structures; main stages of development of the theory of innovation; innovation process models: linear, market demand pressure model, 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 (dual model combining the two previous approaches); ways of innovation entering 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 the psychological characteristics of the individual; team building technologies.

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

Contents of the processes of generating business ideas; 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: the concept and types of business models, key stages in the formation of a business model; mechanism for choosing a business model; functional blocks of the business model; value proposition concept; 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 information collection methods; features of marketing high-tech startups; features of sales of innovative products.

Topic 5. Product development. Product development

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

Topic 6. Customer development. Bringing the product to market

Basics of the concept of Customer development, according to S. Blank and B. Dorff; components of Customer development: identifying consumers, verifying consumers, expanding the client base, building a company; studying the needs and demands of consumers; methods for modeling consumer needs; consumer behavior factors; techniques for attracting consumer attention; assessing the effectiveness of ongoing activities and optimizing the marketing activities of the enterprise; specific behavior of individual and corporate consumers.

Topic 7. Intangible assets and intellectual property protection

The concept of intellectual property, its basic 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 regimes of legal protection of the results of intellectual activity – copyright and patent law; patenting, patenting systems and procedures in Russia, abroad, at the international level; the concepts of "claim of invention (utility model)", "priority", "level of technology", "patent search", "patent purity"; existing legal methods for acquiring and commercializing intellectual property; 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 the person of interest, drawing up a hierarchy. Methods and methods of interaction with stakeholders. Drawing up a stakeholder map.

Topic 9. Creation and development of a startup

Definition and essence of a startup; "lean startup" methodology; SPACE model – a model that reflects space and the "flight" orbit of a business; The HADI cycle is a methodology for the cyclical process of testing hypotheses. Stages of startup development; prototype, product compliance with the expectations of the target market; growth dynamics; growth and strengthening of positions; scaling and capturing markets; 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. Characteristic requirements for managing a startup at different stages. Changing management methods depending on the stage.

Topic 11. Tools for attracting financing

Sources of project financing: funds from the budget and extra-budgetary funds, state development institutions, companies, individual entrepreneurs, private, institutional and foreign investors, financial institutions, scientific and educational institutions; financing instruments: investments from 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 negotiations with investors about project financing.

Topic 12. Assessing the investment attractiveness of the project

Static and dynamic methods for assessing the economic efficiency of innovative projects; principles for assessing project effectiveness; net profit of an innovative project as a criterion of 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 the early stages of project development (before

reaching sustainable sales); criteria for investment readiness of a project for venture investment and their difference from criteria for direct investment.

Topic 13. Project risks

Risks arising during the implementation of an innovative project: the likelihood of loss of competitiveness at certain stages of risk management; risk identification; qualitative and quantitative analysis of the likelihood of the possible impact of risk on the project; application of methods and means to reduce risks and consequences of risk events; monitoring project risks; methods for assessing project risks: expert methods, probabilistic analysis, analogue method, project sensitivity analysis, "decision tree" method (at the project development stage); insurance, diversification; option; a system for assessing the basic risks of an innovative project, planning and implementing 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 for the investor (presentation at the investment session, short pitch, elevator presentation); 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. Innovation ecosystem

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

Topic 16. State innovation policy

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

Topic 17. Final presentation of the group project (pitch session)

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

3.4 Topics of seminars/practical and laboratory classes

3.4.1 Seminars/practical sessions

3.4.1.1 Seminar/practical lesson 1 for topic 1.**Introduction to innovative development**

Presentation of the teacher, checking the suitability of the study group and the number of students in it. Formation of final lists of students with email. postal addresses. Discussion:

– format of individual and collective educational tasks;

– technology presentations for students. Explanation of the rules for student teams working on group projects during the course implementation"Fundamentals of Technological Entrepreneurship";

– organizing and conducting ongoing monitoring of students' knowledge in the form of a survey.

Discussion of the issue"Why I was interested in this technology."

3.4.1.2 Seminar/practical lesson 2 for topic 2.**Team formation and development**

Discussion of the concept of "Business game". Carrying out dspruce game: "Team building." Preparation of 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.

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey. Selecting a test topic.

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

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

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey.

3.4.1.4 Seminar/practical lesson 4 for topic 4.**Marketing. Market assessment**

Discussion of the term "Marketing"case: "Evaluation of the electric sneakers market." Marketing analysis of the group project market. Description of macro- and microenvironmental factors. Estimating the size of the target segment.

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey. Checking and discussing the submitted test papers.

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

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

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey. Selecting a test topic.

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

Discussion of the conceptCustomer development.Case: "Introducing products in the OMD category to the market." Identification of target segments of technology consumers. Modeling the needs of target consumers. Analysis of barriers to meeting needs.

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey.

3.4.1.7 Seminar/practical lesson 7 for topic 7.**Intangible assets and intellectual property protection**

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

Organizing and conducting ongoing monitoring of students' knowledge in the form of a survey. Checking and discussing the submitted test papers.

3.4.1.8 Seminar/practical lesson 8 for topic 8.**Stakeholder management**

Discussion of the concept of "stakeholder".Case: “Diploma defense.” Drawing up a stakeholder map.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey.

3.4.1.9 Seminar/practical lesson 9 for topic 9.**Startup creation and development**

Discussion of startup methods. Business game: “Creation and development of a startup.” Analysis of the pros and cons of creating a startup based on the selected technology.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey.

3.4.1.10 Seminar/practical lesson 10 for topic 10.**Project life cycle management**

Discussion of the concept of “project life cycle”.Business game: “Formation of life startup cycle. Discussion of searching for topical materials in periodical literature.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. Selecting a test topic.

3.4.1.11 Seminar/practical lesson 11 for topic 11.**Tools for attracting financing**

Discussion of project financing tools.Business game: “Selection and justification of sources of financing for an innovative project.” Formation of a financial model for a group project.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. Checking and discussing the submitted test papers.

3.4.1.12 Seminar/practical lesson 12 for topic 12.**Assessment of the investment attractiveness of the project**

Discussion of the investment attractiveness of the project.Business game “Justification of the economic feasibility of the project.” Assessing the investment attractiveness of a group project.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. lesson 12.

3.4.1.13 Seminar/practical lesson 13 for 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 medical treatment.” Project risk analysis. Determination of risk management procedures required for the project.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. Lesson 13. Choosing a test topic.

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

Discussion of project presentation types.Business game: “Presentation of projects to investors.” Discussion of preparing a presentation for a group project.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. lesson 14.

3.4.1.15 Seminar/practical session 15.**Innovation ecosystem**

Discussion of the concept of “innovation environment”.Case: “University Innovation Ecosystem.”Discussionanalysis of the innovation environment of the university, city and region. Assessing the innovative potential of a group project in the context of an innovative environment.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. Lesson 15. Checking and discussing the submitted test papers.

3.4.1.16 Seminar/practical session 16.**State innovation policy**

Discussion of the concept of “state innovation policy”.Case: “State program “Digital Economy”.Discussionanalysis of the group project’s compliance with state priorities within the framework of innovation policy and the markets of the National Technology Initiative.

Organizing and conducting ongoing 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 "presentation for different audiences"Presentation of projects to experts during a pitch session at the end of the training course.

Organizing and conducting ongoing monitoring of students’ knowledge in the form of a survey. lesson 17.Summarizing. Elimination of student debts. Interim certification.

3.4.2 Laboratory exercises

(The topics of classes are indicated with a list of laboratory works)

There are no laboratory classes planned.

3.5 Subjects of course projects (coursework)

Course projects (coursework) are not planned.

4 Educational, methodological and information support

4.1Regulatory documents and GOSTs

Regulatory documents and GOSTs are not used when studying the discipline. When studying the discipline, students can, if necessary, use industry regulations and GOSTs.

4.2Main literature

1. Steve Blank, Startup: a handbook for the founder // M.: Alpina Publisher, 2015 - 616 p.
2. Alexander Osterwalder, Yves Pignier, Building business models // M.: Alpina Publisher, 2015 – 288 p.
3. Economics of innovation: textbook // M.: Ekon. Faculty of Moscow State University named after. M.V. Lomonosova, 2016. - 310 p.

4.3 Additional literature

1. Eric Ries, Business from scratch // M.: Alpina Publisher, 2015 – 250 p.
2. Noam Wasserman, Main book of a business founder // M.: Alpina Publisher, 2014.
3. Clayton Christensen, The Innovator’s Dilemma // M.: Alpina Publisher, 2015 – 290 p.
4. Genrikh Altshuler, Find an idea: an introduction to TRIZ - the theory of solving inventive problems // M.: Alpina Publisher, 2017. - 404 pp.
5. Lawrence Leach, On time and within budget // M.: Alpina Publisher, 2015.
6. Bill Cates, Tell me about me: proven techniques for attracting new clients // M.: Alpina Publisher, 2011.
7. Seth Godin, Try and it will work // M.: Alpina Publisher, 2011.
8. Gassman O., Frankenberger K., Schick M. Business models. 55 best templates. - M.: Alpina Publisher, 2017.
9. Goldratt E., Cox J. Purpose. Continuous improvement process. - M.: Potpourri, 2016. - 400 p.
10. Greengard S. Internet of Things. The future is already here. - M.: Alpina Publisher, 2016. - 188 p.
11. Franks B. Revolution in analytics. How to improve your business in the era of Big Data using operational analytics. - M.: Alpina Publisher, 2017. - 320 p.
12. Boer F.P. Technology cost assessment. Problems of business and finance in the world of research and development. 2007. - 432 p.

4.4 Electronic educational resources

An electronic educational resource on the discipline is under development.

4.5 Licensed and freely distributed software

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

4.6 Modern professional databases and information reference systems

1. ATP "ConsultantPlus: Non-commercial Internet version". - URL:http://www.consultant.ru/online/

5 Logistics support

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

6 Guidelines

6.1 Guidelines for teachers on organizing training

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

The discipline “Fundamentals of Technological Entrepreneurship” is a discipline of the RUP relations part of cycle B.1.2.23.4 of the module “Projects and Project Activities” and ensures the formation of competence in the field of preparation 38.03.02 “Management” profile “Business Process Management”.

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

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

Theoretical study of the main issues of the discipline sections should be reinforced by active practical work within the discipline “Fundamentals of Technology Entrepreneurship"

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

In the conditions of designing educational systems on the principles of the competency-based approach, there has been a conceptual change in the role of the teacher, who, along with the traditional role of a knowledge bearer, performs the function of an organizer of student 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 discussed 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 focused on:

- study of specialized literature and popular periodicals;
- specialized information sites;

- formation of a scientifically based understanding of the characteristics of technological entrepreneurship of modern students;

- setting goals, defining tasks, planning the expected result upon completion of the project.

Clause 3.3 indicates the thematic content of the discipline. Section 3.4 indicates seminar/practical and laboratory classes. The list of basic and additional literature and news information sites required during the teaching of 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 when preparing for seminars/practical classes in the discipline.

The funds of assessment tools for ongoing monitoring and intermediate certification of the student are given in paragraph 7 of the work program, taking into account the competency-based approach in the process of implementing the EP.

Assessment of forms of ongoing control and intermediate certification provides for preparation for testing on the questions proposed in clause 7.3.

6.2 Guidelines for students on mastering the discipline

Obtaining in-depth knowledge in 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 analyze scientific concepts.

Within the discipline, various forms of monitoring the level of students' achievement of the stated indicators of mastering competencies are provided.

Forms of current control – work activity in practical classes, testing.

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

6.2.1 Guidelines for mastering the discipline.

Seminars/practical sessionsare carried out in accordance with the content of this work program in an offline format. Attendance at seminars/practicums is mandatory.

Conducting seminars/practical classes in the discipline "Fundamentals of Technological Entrepreneurship" is carried out in the following forms:

– a survey based on materials discussed in class and studied independently using recommended literature;

– kuysy;

– business games;

– brief analysis and discussion of questions on the topic of the lesson and answers to questions.

Active participation in seminars/practicums is mandatory.

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

6.2.2 Guidelines for extracurricular independent work.

Independent work is the main type of work to master the theoretical materials of the course and acquire work skills during the time free from compulsory training sessions. theoretical material and acquisition of the required skills within the framework of the The goal of independent work is the practical acquisition of competencies by students.

The student's independent work on mastering educational material in an academic discipline can be done in the University library, classrooms, computer classes, and also at home. The content and amount of student's independent work is determined by the discipline's curriculum, teaching materials, practical assignments and instructions from the teacher.

Study of basic and additional literaturein the discipline is carried out on a regular basis in the context of each topic to prepare for the intermediate certification in the discipline “Fundamentals of Technological Entrepreneurship”. The list of basic and additional literature on the discipline is given in paragraph 4 of this work program.

Preparation for practical training.Practical classes allow students to develop creative theoretical thinking, the ability to independently study literature, and analyze practice; They teach you to clearly formulate a thought and conduct a discussion, that is, they are extremely important in the development of independent thinking.

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

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

When preparing to perform as part of a practical lesson, if necessary, you should seek help from the teacher.

Guidelines for preparing for intermediate certification

Interim certification in the discipline “Fundamentals of Technological 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 ongoing monitoring of progress during the semester.

Only students who have completed all types of educational work provided for by the work program in the discipline “Fundamentals of Technological Entrepreneurship” are allowed to take intermediate certification (completed tests, passed intermediate control).

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

Table 1 - Correlation between 100-point and 5-point rating scales

Scores on a 100-point scale	**Points 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

UK-2. Able to determine the range of tasks within the framework of the set goal and choose the best ways to solve them, based on current legal norms, available resources and limitations		
Index	**Evaluation criteria**	
	Not accepted	**Passed**

IUC-2.1. Formulates a set of tasks within the framework of the set goal of the project, the solution of which ensures its achievement IUC-2.2. Determines the connections between the assigned tasks, the main components of the project and the expected results of its implementation IUC-2.3. Selects the optimal methods of planning, distributing areas of responsibility, solving problems, analyzing results, taking into account current legal norms, existing conditions, resources and limitations, possibilities of use	The student demonstrates a lack of knowledge of the techniques of technical and economic justification of design decisions; has not mastered financial, economic planning of an engineering project; not ready to calculate economic indicators	The student demonstrates from a sufficient to fluent level of use of methodological techniques for the feasibility study of design solutions; financial and economic planning of an engineering project; develop a list of technical and economic indicators and carry out their calculations

The teacher can also use an approximate list of questions for the test in the discipline "Fundamentals of Technological Entrepreneurship" to increase the value of the score in accordance with the scale (see clause 7.3).

The criteria for assessing the student's response for the purpose of assessing the achievement of the stated indicators of competence development are given as part of the Federal State Educational Standard 3++ for the discipline in clause 7 of this work program.

The student is allowed to take intermediate certification in the discipline, regardless of the results of the current progress monitoring.

6.2.3 Features of the implementation of discipline for people with disabilities and people with limited health capabilities

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

For students with impaired musculoskeletal function and hearing impairments, lectures and practical classes are provided with multimedia tools and handouts.

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

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

7 Appraisal Fund

7.1 Methods for monitoring and assessing learning outcomes

Code and name of competencies	Indicators of Competency Achievement	Methods of control and evaluation
UK-2. Able to determine the range of tasks within the framework of the set goal and choose the best ways to solve	IUC-2.1. Formulates a set of tasks within the framework of the set goal of the project, the solution of which ensures its achievement IUC-2.2. Determines the connections between the assigned tasks, the main	Interim certification: test Current control: - survey at seminars/ practical classes; - business game;

Code and name of competencies	Indicators of Competency Achievement	Methods of control and evaluation
them, based on current legal norms, available resources and limitations	components of the project and the expected results of its implementation IUC-2.3. Selects the optimal methods of planning, distributing areas of responsibility, solving problems, analyzing results, taking into account current legal norms, existing conditions, resources and limitations, possibilities of use	- case.

7.2 Scale and criteria for assessing learning outcomes

7.2.1 Criteria for assessing the answer to the test

(formation of competence UK-2, indicators IUC-2.1, IUC-2.2, IUC-2.3)

Interim certification 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 curriculum in the discipline "Fundamentals of Technological Entrepreneurship", and the results of ongoing monitoring of progress during the semester are taken into account. Assessment of the degree to which students have achieved the planned learning outcomes in the discipline is carried out by the teacher leading classes in the discipline in accordance with a point-based assessment scale.

Based on the results of the intermediate certification for the discipline, a grade of "pass" or "fail" is assigned.

Grading 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 feasibility studies of design solutions; carry out financial and economic planning of the project; calculate technical and economic indicators. In this case, minor errors, inaccuracies, and difficulties during analytical operations and the transfer of knowledge and skills to new, non-standard situations may be made. Competencies have been formed.
Uncredited	One or more types of educational work provided for by the curriculum have not been completed. The student does not demonstrate theoretical knowledge and is not able to use methodological techniques for the feasibility study of design solutions; does not know how to carry out financial and economic planning of an engineering project; is not able to draw up technical specifications for the development of a radio engineering system from the point of view of technical and economic indicators and is not able to quickly respond to clarifying questions; he experiences significant difficulties in operating knowledge and skills when transferring them to new situations. Competencies have not been developed.

7.2.2. Criteria for assessing student work in practical classes

(formation of competence UK-2, indicators IUC-2.1, IUC-2.2, IUC-2.3)

"5" (excellent):the student actively participated in the discussion of the topic of the practical assignment provided for by the practical lesson plan; used methodological techniques for feasibility studies of design solutions; applied financial and economic planning of an engineering project; determine the list and calculate technical and economic indicators. The student answered all the control questions clearly and without errors, worked actively in practical classes; completed control work; participated in business games and cases.

"4" (good):the student participated in the discussion of the topic of the practical assignment provided for in the practical lesson plan; the student, with corrective comments from the teacher, used methodological techniques for feasibility studies of design solutions; applied financial and economic planning of an engineering project; determine the list and calculate technical and economic indicators. The student answered all test questions and worked quite actively in practical classes; completed control work; participated in business games and cases, but did not perform.

"3" (satisfactory):the student participated fragmentarily in the discussion of the topic of the practical assignment provided for by the practical lesson plan; the student, with corrective comments from the teacher, calculates technical and economic indicators; the student answered some test questions with comments; did not submit completed tests; did not actively participate in business games and cases..

"2" (unsatisfactory):the student did not participate in the discussion of the practical assignment issues provided for in the practical lesson plan; the student did not use methodological techniques for feasibility studies of design solutions; could not calculate technical and economic indicators; the student answered the test questions with errors or did not answer the test questions; did not complete tests; did not take part in business games and cases..

7.2.3. Criteria for assessing test results

Testing in the discipline "Fundamentals of Technological Entrepreneurship" is not carried out.

7.3 Evaluation tools

7.3.1 Monitoring

(formation of competence UK-2, indicators IUC-2.1, IUC-2.2, IUC-2.3)

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 principles of forming a project team.
7. What is the impact of risks on the project implementation process?
8. How the project life cycle is managed.
9. What is the social effect of the project?
10. How to use the Han chart in time management of project management.
11. How a strategy is developed and a project marketing budget is drawn up.
12. What is the economic effect of the project?
13. The project as a system, its structure and documentation: project map, project passport.
14. Business plan: types, contents, sections and characteristics.
15. The project team and the social roles of its participants.
16. Project time limits, Gantt chart.
17. Acceptable/unacceptable risk indicators and project risk assessment.
18. Assessing project efficiency: modern methods for calculating it.
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 feasibility study of design solutions.

21. Financial and economic planning of an engineering project.
22. Terms of reference for the development of a radio engineering system from the point of view of technical and economic indicators.

Sample business game"Team Building"as part of a practical lesson:"SYNCHRON"

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 leave your desk to participate. The facilitator gives the task to each participant 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, notice non-verbal signs.

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

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

Tasks:

- Determining market capacity
- Building a socio-demographic portrait of the consumer

Methodology:

Quantitative research (survey of potential consumers). Target group - persons who are potential buyers of the product.

Marketing research of product price

Tasks:

- Market segmentation and determination of the manufacturer's share
- Identifying the role of price in the list of product selection criteria
- Determining the optimal price for the product manufacturer

Methodology:

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

An approximate list of tests completed in the form of an abstract/essay:

1. A written answer to the question: "Why am I interested in this technology?"
2. Preparation of 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 project business model based on the template of A. Osterwalder and I. Peña.
4. Marketing analysis of the group project market. Description of macro- and microenvironmental factors. Estimating 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 students
9. Studying 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 selected technology

11. Estimating the cost of performing work and determining the contract price. Description of project resources. Preparing a presentation for a commercial client
12. Formation of a financial model for a group project
13. Assessing the investment attractiveness of a group project
14. Project risk analysis. Determination of risk management procedures required for the project
15. Preparing a group project presentation
16. Analysis of the innovation environment of the university, city and region. Assessing the innovative potential of a group project in the context of an innovative environment
17. Analysis of the group project's compliance with state priorities within the framework of innovation policy and the markets of the National Technology Initiative
18. Preparation of a project presentation to external experts during a pitch session at the end of the training course

7.3.2 Interim certification

An approximate list of questions to be tested

1. Concept, goals and objectives of project management.
2. International and Russian project management associations.
3. Relevance of innovation project management.
4. Goals and objectives of project management.
5. Concept, classification and characteristics of an innovative project.
6. Contents, 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 project management stages.
17. Basic principles of forming a project team
18. Basic principles of team development
19. Team communication management.
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 goal tree.
26. Examination of innovative projects.
27. Methods for assessing and selecting innovative projects.
28. Evaluating the effectiveness of innovative projects.
29. Project planning processes and levels.
30. Parameters and characteristics of design work.
31. Assessment of the social significance of the project.
32. Assessment of the economic significance of the project.