

**Federal State Autonomous Educational Institution of Higher Education "Moscow  
Institute of Physics and Technology  
(National Research University)"**

**APPROVED**  
**Vice Rector for Academic Affairs**

**A.A. Voronov**

**Work program of the course (training module)**

**course:** (N)ever the Same Phystech: History and Culture of MIPT from Ancient Times to the Present Day/(He) тот Физтех: история и культура МФТИ с незапамятных времен до наших дней

**major:** Applied Mathematics and Physics

**specialization:** Beam-Plasma Systems and Technologies/Пучково-плазменные системы и технологии  
Phystech School of Aerospace Technology  
Educational and scientific center for the humanities and social sciences

**term:** 1

**qualification:** Master

Semester, form of interim assessment: 1 (fall) - Exam

Academic hours: 30 АЧ in total, including:

lectures: 30 АЧ.

seminars: 0 АЧ.

laboratory practical: 0 АЧ.

Independent work: 30 АЧ.

Exam preparation: 30 АЧ.

In total: 90 АЧ, credits in total: 2

Number of course papers, tasks: 2

Author of the program: I.A. Antoshchuk, senior professor

The program was discussed at the Educational and scientific center for the humanities and social sciences 13.05.2024

## **Annotation**

MIPT is proud of its history and traditions, its students, alumni and employees. MIPT is famous for the sense of solidarity among phystechs and their ability to solve the most difficult problems and find the most daring solutions. The uniqueness of Phystech was formed over many years of its rich and complex history. Everyday students meet the institute's past on their way: renowned founding fathers P. Kapitsa, L. Landau, and N. Semenov leisurely talk near the Microelectronics Building, bright Nobel laureates invitingly look at them from the lobby walls of the Laboratory Building, and Phystech rectorors show precious memorable things on the third floor of the Main Building. However, how well do they (and we) know the history of the place where we study and work? In the constant rush of daily tasks, students rarely get a chance to study the history of the institute with enough effort and in sufficient depth. Our course fills this gap and offers a truly immersive experience of the history and culture of Phystech from its first years to the present moment. Being a joint product of the research group on the History of Soviet Science (Centre for Interdisciplinary Studies), the MIPT Museum and the Phystech History Club, the course has three distinctive advantages:

- 1) it places the history of MIPT in the context and in relation to the history of Soviet and post-Soviet science and technology, socio-cultural history of higher education;
- 2) it enables students to engage in work with primary sources, including archival documents, memoirs, periodicals, oral history materials;
- 3) it offers creative and non-conventional forms of independent work (excursions, podcasts, video programs etc), enabling students to make a real contribution to the initiatives aimed at understanding and popularising the history of the institute for the Phystech community.

The course combines chronological order with problem-oriented perspective and focused on the most important events in the history of MIPT, considering them in relation to scientific and technological development in Russia and the USSR and more widely in the context of transnational comparative history of science and technology. The course examines historical events and processes from the perspective of classical and contemporary historiography, social and cultural history and the sociology of science. The course is based on a selected set of scientific literature and a broad collection of primary sources. Combining lectures, seminars and practical work, as well as creative tasks, the course enables students to get acquainted with historical visions and conceptual tools, with the methods of empirical research (analysis of documents, memoirs, interviews, etc.) and some aspects of museum activities. The course encourages the training of critical thinking and scientific communication skills, including argumentation, discussion as well as the oral and written communication competences.

## **1. Study objective**

### **Purpose of the course**

- to form a comprehensive understanding of the history and culture of MIPT as a special type of higher polytechnic school from its inception to the present in the context of scientific and technological development of the country, including the history of technological breakthroughs, the organization of scientific research and the socio-cultural history of higher education in the post-war, late Soviet and post-Soviet periods.

### **Tasks of the course**

- 1) to enable students to improve their knowledge and critical understanding of the history of MIPT, the key events, main stages and directions of the institute's development;
- 2) to encourage students to trace complex interconnections between the history of MIPT and the patterns, challenges and achievements of scientific and technical development of the USSR and post-Soviet Russia;
- 3) to enable students to develop a comprehensive understanding of the place and role of MIPT as a special type of higher polytechnic school within the higher education system of the late Soviet USSR and post-Soviet Russia;
- 4) to encourage students' interest and motivation to study the history of MIPT, to contribute to the formation of a sense of belonging to the culture of Phystech and identification with the community of phystechs;
- 5) to improve the ability to collect, analyse and summarise historical information, to familiarize students with conceptual and methodological tools of history and related social sciences as well as with various types of primary sources (archival documents, ego documents, periodicals, oral history, etc.);
- 6) to encourage the involvement of students in interdisciplinary social studies of MIPT, (post)-Soviet science and technology studies;

7) to encourage students' interest and participation in the projects of the History of Science and Technology group (Centre for Interdisciplinary Studies), the MIPT Museum, and the Phystech History Club;

8) to develop oral and written communication skills, presentation and discussion skills, critical thinking and general analytical skills.

## 2. List of the planned results of the course (training module), correlated with the planned results of the mastering the educational program

Mastering the discipline is aimed at the formation of the following competencies:

Code and the name of the competence	Competency indicators
UC-1 Use a systematic approach to critically analyze a problem, and develop an action plan	UC-1.1 Systematically analyze the problem situation, identify its components and the relations between them
	UC-1.2 Search for solutions by using available sources
	UC-1.3 Develop a step-by-step strategy for achieving a goal, foresee the result of each step, evaluate the overall impact on the planned activity and its participants
UC-5.1 Analyze and consider cultural diversity in intercultural interactions	UC-5.1 Identify specific philosophical and scientific traditions in major world cultures
	UC-5.2 Define the theoretical and practical significance of cultural and linguistic factors within various interrelated philosophical and scientific traditions
UC-6 Determine priorities and ways to improve performance through self-assessment	UC-6.1 Achieve personal growth and professional development, determine priorities and ways to improve performance
	UC-6.2 Evaluate performance results in correlation with the set objectives and applied methods

## 3. List of the planned results of the course (training module)

As a result of studying the course the student should:

know:

- key events and personalities, main stages and directions of MIPT development in the context of scientific and technical development of the USSR and post-Soviet Russia;
- the place and role of MIPT as a special type of higher polytechnic school in the higher education system of the late Soviet USSR and post-Soviet Russia;
- basic approaches and terminology of the history of science and technology, socio-cultural history of higher education;
- main methods of empirical social and historical research.

be able to:

- identify, formulate and analyse the problems of the institute's history, establish cause-and-effect relationships between the trajectories of MIPT development, patterns of transformation of higher education and scientific and technical development of the USSR and post-Soviet Russia;
- present the results of analytical work on the selected topic orally and in writing;
- formulate, argue and defend their opinion on the given problem orally and in writing;
- evaluate and select the necessary data, analyse, systematize and summarize the necessary information;
- create and present creative products based on historical sources and historical research.

master:

- knowledge about key events and personalities, stages and trajectories of MIPT development in the context of scientific and technical development of the USSR and post-Soviet Russia;
- the main approaches and terminology of the history of science and technology, the socio-cultural history of higher education;
- the basics of empirical social and historical research methods;
- academic oral and written communication skills, presentation and discussion skills,
- critical thinking and general analytical skills.

#### 4. Content of the course (training module), structured by topics (sections), indicating the number of allocated academic hours and types of training sessions

##### 4.1. The sections of the course (training module) and the complexity of the types of training sessions

№	Topic (section) of the course	Types of training sessions, including independent work			
		Lectures	Seminars	Laboratory practical	Independent work
1	Introduction. Origins of MIPT. Basic approaches in the history and social sciences.	2			2
2	Main stages and trajectories of MIPT history in the context of scientific and technological development of Russia and USSR	10			10
3	Key issues and phenomena of MIPT history and culture	18			18
AH in total		30			30
Exam preparation		30 AH.			
Total complexity		90 AH., credits in total 2			

##### 4.2. Content of the course (training module), structured by topics (sections)

Semester: 1 (Fall)

###### 1. Introduction. Origins of MIPT. Basic approaches in the history and social sciences.

Higher education in the USSR in the pre-war period: separation of higher education and research, its specific features and limitations. Industrialisation and cultivation of a “new” Soviet engineer. Pre-war initiatives to create a higher polytechnic school and their origins: international experience, ideas, institutions. The experience of A.F.Ioffe and the Leningrad Institute of Physics and Technology.

Social and cultural history of science and education. Approaches and methods. Structure and content of the course. Forms of control.

###### 2. Main stages and trajectories of MIPT history in the context of scientific and technological development of Russia and USSR

The block “Main stages and trajectories of MIPT history in the context of scientific and technological development of Russia and USSR” incorporates several lectures, embracing the history of the institute from its launch as a faculty of Moscow State University to the contemporary development trends in 2010-2020s. This block includes the following topics: The post-war period: the first (1946) and second birth (1951) of MIPT; MIPT in the culture of the Cold War; "The Golden Age of Phystech": O.M.Belotserkovsky (1962-1987) and MIPT in late Soviet period; New hopes and challenges: the collapse of the USSR and early post-Soviet years; The transformation and revival of MIPT in the 2000s.

### 3. Key issues and phenomena of MIPT history and culture

The block “Key issues and phenomena of MIPT history and culture” is devoted to the the main aspects of intellectual and cultural life, including the following topics: Scientific schools at MIPT; Scientific school of L.D.Landau; (Inter)disciplinary extensions; «Raising» scientists and student science; Student life at Phystech; University with a “male” character; History of MIPT on campus: museum, archives, exhibitions; MIPT paper “For science”; MIPT history from below: memoirs and oral history.

## 5. Description of the material and technical facilities that are necessary for the implementation of the educational process of the course (training module)

The implementation of academic discipline requires an audience of appropriate capacity. When lecturing, a marker or slate, chalk/markers, tables, charts are used. Technical training tools: computer with licensed software, multimedia projector.

## 6. List of the main and additional literature, that is necessary for the course (training module) mastering

### Main literature

Рекомендуемая литература для самостоятельного изучения:

Рачков, М. Ю. История науки и техники : учебник для вузов / М. Ю. Рачков. — 3-е изд., испр. и доп. — Москва : Издательство Юрайт, 2024. — 297 с. — (Высшее образование). — ISBN 978-5-534-15022-3. — Текст : электронный // Образовательная платформа Юрайт [сайт]. — URL: <https://urait.ru/bcode/543060> (дата обращения: 14.05.2024).

### Additional literature

## 7. List of web resources that are necessary for the course (training module) mastering

<https://mipt-museum.ru/>  
<https://zanauku.mipt.ru/about/magazine-archive/>  
<https://www.youtube.com/channel/UCKMkNOH7Pl2uoATjuKvR9Gw>  
<https://mfti-biology.com/>  
<https://old.mipt.ru/alumni/intervyu-s-vypusknikami/>

## 8. List of information technologies used for implementation of the educational process, including a list of software and information reference systems (if necessary)

Multimedia technology is used in lecture classes, including the demonstration of presentations.

## 9. Guidelines for students to master the course

While studying a student should independently replenish his knowledge and study the fundamental publications in subject area. Successful mastering of the course requires hard work of the student directly on lecture, and also independent work for assimilation of the passed material and the solution of the set of theoretical problems.

## SUPPLEMENT

### Assessment funds for course (training module)

**major:** Applied Mathematics and Physics  
**specialization:** Beam-Plasma Systems and Technologies/Пучково-плазменные системы и технологии  
Phystech School of Aerospace Technology  
Educational and scientific center for the humanities and social sciences  
**term:** 1  
**qualification:** Master

Semester, form of interim assessment: 1 (fall) - Exam

**Author:** I.A. Antoshchuk, senior professor

## 1. Competencies formed during the process of studying the course

Code and the name of the competence	Competency indicators
UC-1 Use a systematic approach to critically analyze a problem, and develop an action plan	UC-1.1 Systematically analyze the problem situation, identify its components and the relations between them
	UC-1.2 Search for solutions by using available sources
	UC-1.3 Develop a step-by-step strategy for achieving a goal, foresee the result of each step, evaluate the overall impact on the planned activity and its participants
UC-5.1 Analyze and consider cultural diversity in intercultural interactions	UC-5.1 Identify specific philosophical and scientific traditions in major world cultures
	UC-5.2 Define the theoretical and practical significance of cultural and linguistic factors within various interrelated philosophical and scientific traditions
UC-6 Determine priorities and ways to improve performance through self-assessment	UC-6.1 Achieve personal growth and professional development, determine priorities and ways to improve performance
	UC-6.2 Evaluate performance results in correlation with the set objectives and applied methods

## 2. Competency assessment indicators

As a result of studying the course the student should:

### know:

- key events and personalities, main stages and directions of MIPT development in the context of scientific and technical development of the USSR and post-Soviet Russia;
- the place and role of MIPT as a special type of higher polytechnic school in the higher education system of the late Soviet USSR and post-Soviet Russia;
  - basic approaches and terminology of the history of science and technology, socio-cultural history of higher education;
  - main methods of empirical social and historical research.

### be able to:

- identify, formulate and analyse the problems of the institute's history, establish cause-and-effect relationships between the trajectories of MIPT development, patterns of transformation of higher education and scientific and technical development of the USSR and post-Soviet Russia;
- present the results of analytical work on the selected topic orally and in writing;
- formulate, argue and defend their opinion on the given problem orally and in writing;
- evaluate and select the necessary data, analyse, systematize and summarize the necessary information;
- create and present creative products based on historical sources and historical research.

### master:

- knowledge about key events and personalities, stages and trajectories of MIPT development in the context of scientific and technical development of the USSR and post-Soviet Russia;
- the main approaches and terminology of the history of science and technology, the socio-cultural history of higher education;
- the basics of empirical social and historical research methods;
- academic oral and written communication skills, presentation and discussion skills,
- critical thinking and general analytical skills.

### 3. List of typical control tasks used to evaluate knowledge and skills

Examples of questions for discussion and control of material assimilation:

- 1) What factors contributed to the creation of the Moscow Institute of Physics and Technology (MIPT)?
- 2) What was the peculiarity of MIPT in comparison to other higher education institutions of the USSR?
- 3) What were the specific features of professional training at Phystech?
- 4) What role did the academic culture of Soviet physics play at forming Phystech?
- 5) How did the arms race and the international confrontation of the Cold War impact MIPT?
- 6) What were the main trends of science and technology development in the late Soviet period? How have they formed the history of MIPT?
- 7) What changes occurred in the structure and organization of the MIPT in the late Soviet period?
- 8) How has MIPT adapted to the changes in the political and economic situation in Russia after the collapse of the USSR?
- 9) Describe the major trends in international intellectual emigration from Russia after the collapse of the Soviet Union. How did these processes affect MIPT?
- 10) How has the status and prestige of MIPT changed from the moment of its foundation to the present?

### 4. Evaluation criteria

1. The historical origins of MIPT
2. The birth of the FTF (faculty of physics and technology) and the foundation of the MIPT: key events, challenges and factors.
3. MIPT as a special type of higher polytechnic school: key features of the Phystech system.
4. FTF/ MIPT in the first post-war years. The influence of the ideological and military confrontation during the Cold War.
5. The growth and development of MIPT in the late Soviet period in the context of scientific and technical development of the USSR.
6. Student life at Phystech: everyday life, leisure, culture, community.
7. From the Institute of Physics and Technology to the university: integration of biological and chemical sciences, social and humanitarian education, interdisciplinarity.
8. MIPT during the socio-economic crisis of the 1990s. Challenges and opportunities.
9. Transformation of the organization of science at MIPT: from basic departments to building up their own scientific potential.
10. Contemporary vision and development strategy of MIPT. New trends, contradictions and opportunities.

Exam assignment example:

1. The historical origins of MIPT
2. The birth of the FTF (faculty of physics and technology) and the foundation of the MIPT: key events, challenges and factors.

The grade "excellent (10)" - deserves a student who has found a comprehensive, systematic and in-depth knowledge of the educational program material, who has independently completed all tasks provided by the program, who has thoroughly mastered the main and additional literature recommended by the program, who has actively worked in the classroom, who understands the basic scientific concepts of the discipline, who has shown creativity and scientific approach in understanding and presenting the educational program material, whose answer is distinguished by the richness and accuracy of the terms used.



The grade "excellent (9)" - deserves a student who has found a comprehensive, systematic knowledge of the educational program material, independently completed all tasks provided by the program, who has thoroughly mastered the basic literature and familiar with additional literature recommended by the program, actively working in the classroom, showing a systematic nature of knowledge in the discipline, sufficient for further study, as well as the ability to replenish them independently, whose answer is distinguished by the accuracy of the terms used, and the presentation of the material in it after the completion of the program.

The grade "excellent (8)" - deserves a student who has found full knowledge of the educational program material, not allowing significant inaccuracies in the answer, independently completed all the tasks provided by the program, mastered the basic literature recommended by the program, actively working in the classroom, showing a systematic nature of knowledge in the discipline, sufficient for further study, as well as the ability to replenish them independently.

The grade "good (7)" - deserves a student who has found a sufficiently complete knowledge of the curriculum material, not allowing significant inaccuracies in the answer, independently completed all the tasks provided by the program, mastered the basic literature recommended by the program, actively working in the classroom, showing the systematic nature of knowledge in the discipline, sufficient for further study, as well as the ability to replenish them independently.

The grade "good (6)" - deserves a student who has found a sufficiently complete knowledge of the educational program material, not allowing significant inaccuracies in the answer, independently completed the main tasks provided by the program, mastered the basic literature recommended by the program, characterized by sufficient activity in the classroom, showed a systematic nature of knowledge in the discipline, sufficient for further study.

The grade "good (5)" - is deserved by the student who has found out the knowledge of the basic educational program material in the volume necessary for further study and the forthcoming work on profession, not distinguished by activity at classes, independently carried out the basic tasks provided by the program, mastered the basic literature recommended by the program, but made some mistakes at their performance and in the answer at the test, but possessing the necessary knowledge for independent elimination of the admitted mistakes.

The grade "satisfactory (4)" - is deserved by the student who has found out the knowledge of the basic educational program material in the volume necessary for the further study and the forthcoming work on a profession, not distinguished by activity at classes, independently carried out the basic tasks provided by the program, mastered the basic literature, recommended by the program, however made some errors at their performance and in the answer on the credit, but possessing necessary knowledge for elimination under the guidance of the teacher of the admitted errors.

The grade "satisfactory (3)" - deserves a student who found knowledge of the basic educational program material in the volume necessary for further study and future work in the profession, not distinguished by activity in the classroom, independently completed the main tasks provided by the program, but made errors in their performance and in the answer at the test, but has the necessary knowledge to eliminate the most significant errors under the guidance of the teacher.

The grade "unsatisfactory (2)" - is given to the student who has found gaps in knowledge or lack of knowledge of a significant part of the basic educational program material, who has not performed independently the basic tasks provided by the program, who has made fundamental errors in the performance of tasks provided by the program, who makes significant errors in the answer, and is unable to continue learning or start professional activity without additional training in the relevant discipline.

The grade "unsatisfactory (1)" - no answer (refusal to answer) or the submitted answer does not correspond to the essence of the questions contained in the assignment.

## **5. Methodological materials defining the procedures for the assessment of knowledge, skills, abilities and/or experience**

The final grade is calculated on the basis of grade for each type of work during the course:

Participation in discussions: 20%

Mid-term work: 30%

Final work: 50 %

Participation in seminars involves independent reading, analysis of literature and its discussion in the classroom. Practical work/ workshops presuppose analysis of primary sources, fulfilling creative tasks and discussing the results in a group. Mid-term work can be accomplished in several formats: an analytical summary of a scientific article, a mini-report on the results of the analysis of the primary source (document, newspaper, memoir, interview). The final work can be accomplished in several creative formats: a mini-study, an essay, a temporary exhibition project, an excursion, a podcast, a video clip, a quest or an interactive game on topics related to the history and culture of MIPT. Depending on the scale and complexity of the chosen format, final work can be done either individually or in a group. In the last two classes, students present their final works. Upon successful completion of all course assignments indicated in the programme, students receive a final grade for the course based on the specified formula and are exempt from the oral exam. If students have not completed some assignments or would like to improve their grade for the course, they can choose to take an oral exam on the main topics and questions of the course. The oral score is 50% of the total score. During the oral exam, students can use the course program.