

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

APPROVED
**Head of the Phystech School of
Applied Mathematics and
Informatics**
A.M. Raygorodskiy

Practice program

course:	Introductory Practical Training/Ознакомительная практика
major:	Applied Mathematics and Informatics
specialization:	Advanced Methods of Modern Combinatorics/Продвинутые методы современной комбинаторики Физтех-школа Прикладной Математики и Информатики Chair of Discrete Mathematics
term:	1
qualification:	Master
type of practice:	training
practice method:	mipt-based

Semester, form of interim assessment: 1 (fall) - Pass/fail exam

Author of the program: A.M. Raygorodskiy, doctor of physics and mathematical sciences, full professor, head of chair

The program was discussed at the Chair of Discrete Mathematics 08.04.2024

Annotation

The practice is part of the educational process, designed to ensure a close connection between scientific, theoretical and practical training, to give students initial practical experience in accordance with the profile of the program.

1. General characteristics of practice

Purpose of the course

The purpose of the practice is to obtain primary professional skills and professional experience in the field of mathematical modeling of physical, computer and economic systems, computational mathematics, computer technology and data mining. The practice is conducted for the purpose of practical training of students and is aimed at the formation, consolidation, development of practical skills and competencies in the profile of the educational program. During the internship, students prepare for a research type of professional activity.

Purpose of practice

- study of scientific information on the research topic;
- study of research methods;
- mastering the methods of statistical processing of scientific data;
- preparation of a report on the results of the practice.

Forms of practice: dispersed

2. List of the planned results of the practice

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

Code and the name of the competence	Competency indicators
Pro.C-1 Become part of a professional community and conduct local research under scientific guidance using methods specific to a particular professional setting	Pro.C-1.1 Apply principles of scientific work, methods of data collection and analysis, ways of argumentation; prepare scientific reviews, publications, abstracts, and bibliographies on research topics in Russian and English
	Pro.C-1.2 Understand the verification process of software models used to solve related scientific problems
	Pro.C-1.3 Use practical knowledge of scientific argumentation when analyzing a research subject area
Pro.C-2 Understands and is able to apply modern mathematical apparatus and algorithms, the basic laws of natural science, modern programming languages and software; operating systems and networking technologies in research and applied activities	Pro.C-2.1 Demonstrate expert knowledge of research basics in the field of ICTs, philosophy and methodology of science, scientific research methods, and apply skills to use them
	Pro.C-2.2 Demonstrate practical experience of applying methods and digital signal processing algorithms, using the Internet, abstracting, referencing, searching for bibliographic sources, and working with scientific sources
	Pro.C-2.3 Use fundamental knowledge in the field of information theory to carry out research tasks

3. List of the planned results of the practice

As a result of studying the course the student should:
know:

- to have an idea about the content of scientific activity, about modern research in the field corresponding to the profile of the educational program;
- methods of theoretical and experimental research in the field corresponding to the profile of the educational program;
- principles of organization of experiments and tests;
- principles of registration of the results of scientific research.

be able to:

- to review the available material to solve the task;
- use the selected method or combine different methods in solving the task;
- apply modern methods of data collection and processing during practical training;
- build activities based on the fulfillment of technological requirements and standards, adhere to legal and ethical standards adopted in professional activities;
- to formalize and present the results of the work performed.

master:

- skills in analyzing scientific and technical information in the field corresponding to the profile of the educational program.

4. Practice content

4.1. Main stages of practice

№	Practice stage content	Labor intensity (hours), including independent work
1 semester		
1	The preparatory stage	135
2	Review and analysis of modern tools and technologies	135
3	Project implementation	135
4	Presentation of the results	135
Total AH in 1 semester		540
AH in total		540

4.2. Work content

Semester: 1 (Fall)

1. The preparatory stage

Familiarization with the topic and objectives of the practice. Students' choice of individual projects, development of technical specifications.

2. Review and analysis of modern tools and technologies

The study of available technologies, tools, libraries for the implementation of the project. Selection and justification of the technologies used. Formulation of tasks for the implementation of the project. Planning the deadlines for their implementation.

3. Project implementation

Work directly on the implementation of the project: writing source code, deploying the application on a cloud platform.

4. Presentation of the results

Preparation of a report on the work performed in the presentation format, presentation at the final lesson.

4.3. Practice supervision

The management of the practice is carried out by an appointed teacher, whose duties include:

- educational and methodological guidance of the practice;
- development of individual tasks for students performed during the practice period;
- assistance to students in developing an internship plan;
- conducting consultations (research seminars, lectures) on modern technologies in the field of web application development;

- monitoring the implementation of the plan;
- checking the reporting documentation on the implementation of the practice.

The results of the practical work should be presented in the form of a presentation demonstrating the work of the developed web application and presented for evaluation at the last lesson within the framework of the test week. The source code of the project is attached to the presentation.

According to the results of the practice, the head of the practice gives the student an assessment.

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

To conduct an internship, you need: a workplace in an educational or scientific unit that is a place of practice, a workplace for independent work containing a personal computer with access to the Internet and the MIPT electronic educational environment, classrooms for group and individual consultations, intermediate certification (at the place of internship). Place of practice: scientific laboratories of the basic, institute and faculty departments of the Phystech School of Applied Mathematics and Computer Science.

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

Main literature

1.

Additional literature

1. Искусство писать научные статьи, научно-практическое руководство / Е. З. Мейлихов. — Долгопрудный, Интеллект, 2020.— URL: <http://books.mipt.ru/book/301312> (дата обращения: 18.12.2020). - Полный текст (Режим доступа : из сети МФТИ / Удаленный доступ)
2. Annotating and Summarizing, учебно-методическое пособие по курсу "Академическое письмо в научно-технических специальностях: теория и практика"/Министерство науки и высшего образования Российской Федерации, Московский физико-технический институт (национальный исследовательский университет), Департамент иностранных языков; составитель Т. Б. Аленькина,-Москва, МФТИ, 2020

7. List of curricular resources for independent work on practice

1. QuestelOrbit<https://www.orbit.com/>– объединяет около 100 баз данных, предназначенных специалистам в области патентоведения, дизайнерам и широкому кругу исследователей. Основная патентная база FamPat содержит данные 95 патентных ведомств всех регионов мира; патенты объединены в семьи по тематическому признаку.
2. InspecAnalytics аналитический модуль базы данных Inspec<https://inspec-analytics-app.theiet.org/>
3. InspecAnalytics позволяет визуализировать результаты поиска, сравнивать полученные результаты на уровне учреждений, авторов, тематик по количеству публикаций. Новые функциональные возможности позволяют пользователям получать новые идеи и выявлять тенденции и модели, которые ранее были недоступны. InspecAnalytics ориентирован на специалистов, занятых развитием науки и научного управления.
4. Журналы SAGE
<https://journals.sagepub.com/action/doSearch?filterOption=allJournal&AllField=research&content=journalTitle&target=titleSearch&pageSize=100&startPage=0>
5. Журналы Taylor&Francis<https://www.tandfonline.com/action/doSearch?AllField=research&startPage=&target=titleSearch&content=title>
6. Журналы Wiley
<https://onlinelibrary.wiley.com/action/doSearch?AllField=science+research&startPage=&PubType=journal>

8. List of web resources that are necessary for the practice mastering

Software: MS OfficeMSWindows XP.

9. Guidelines for students to master the course

The assignment for practice is determined by the supervisor, taking into account the specifics of the research work of the department or the base enterprise. The basis of the content of the student's independent work during the implementation of the internship program is the development of methods, techniques, technologies for analyzing and systematizing scientific and technical information, developing plans and programs for conducting scientific research and acquiring practical skills in carrying out research activities, taking into account the interests and capabilities of the department or the base enterprise where it is conducted. When performing an individual task, the student must combine practical work on the subject of the task with theoretical study of the issue using recommended information resources. When working with literary sources, it is recommended to make a short summary with mandatory fixation of the bibliographic data of the source. The research work ends with the writing of a report in accordance with the forms.

SUPPLEMENT

Assessment funds for practice

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Author:	A.M. Raygorodskiy, doctor of physics and mathematical sciences, full professor, head of chair

1. Competencies formed during the process of studying the practice

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2. Competency assessment indicators

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master:

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3. Student practice reporting

The interim certification in practice is carried out in the form of a credit.

During the period of practice, the student is obliged to:

- fully implement the plan;
- follow the instructions of the head;
- be responsible for the work performed and its results.

The assessment for research practice is given to the student by the supervisor based on the results of the defense of his work. The protection of the practice results is carried out in the form of a scientific seminar of the department. When evaluating the practice, the following is taken into account:

- feedback from the head;
- implementation of the plan;
- presentation of practice results;
- a report on the practice of the established form.