

**БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ /
BELARUSIAN STATE UNIVERSITY**

УТВЕРЖДАЮ / APPROVED

**Проректор по учебной работе
и образовательным инновациям**

**Белорусского государственного университета/
Vice-Rector for Academic Affairs and Education
Innovations of BSU**



О.Г.Прохоренко /Alesia G.Prakharenka

Регистрационный/Registration № 2604 m/pr.

ПРОГРАММА / PROGRAM

производственной научно-исследовательской практики / Research Internship

Для специальности / For speciality:

7-06-0533-06 Механика и математическое моделирование /

7-06-0533-06 Mechanics and mathematical modeling

СОСТАВИТЕЛИ:

С.М. Босяков, декан механико-математического факультета Белорусского государственного университета, доктор физ.-мат. наук, профессор;
Н.Б. Яблонская, доцент кафедры общей математики и информатики Белорусского государственного университета, кандидат физ.-мат. наук;
Д.Ф. Базылев, заведующий кафедрой геометрии, топологии и методики преподавания математики БГУ, кандидат физико-математических наук, доцент;
М.Г. Ботогова, заведующий кафедрой био- и наномеханики БГУ, кандидат физико-математических наук, доцент;
Н.В. Бровка, заведующий кафедрой теории функций БГУ, доктор пед. наук, профессор;
А.Л. Гладков, заведующий кафедрой интеллектуальных методов моделирования БГУ, доктор физ.-мат. наук, профессор;
Л.Л. Голубева, заведующий кафедрой дифференциальных уравнений и системного анализа БГУ, кандидат физ.-мат. наук, доцент;
М.В. Игнатенко, заведующий кафедрой веб-технологий и компьютерного моделирования БГУ, кандидат физ.-мат. наук, доцент;
М.А. Журавков, заведующий кафедрой теоретической и прикладной механики БГУ, доктор физ.-мат. наук, профессор;
С.В. Тихонов, заведующий кафедрой высшей алгебры и защиты информации БГУ, кандидат физико-математических наук, доцент;
М.А. Николайчик, доцент кафедры теоретической и прикладной механики БГУ, кандидат физ.-мат. наук

РЕКОМЕНДОВАНА К УТВЕРЖДЕНИЮ:

Кафедрой теоретической и прикладной механики Белорусского государственного университета
(протокол № 11 от 26.04.2024);

Советом механико-математического факультета Белорусского государственного университета
(протокол № 8 от 26.04.2024)

Заведующий кафедрой теоретической
и прикладной механики

М.А. Журавков

ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Программа производственной научно-исследовательской практики является частью образовательной программы магистратуры, реализуемой в очной (дневной) форме получения образования по специальности 7-06-0533-06 «Механика и математическое моделирование» (профилизация: теоретическая и прикладная механика).

Программа составлена на основе образовательного стандарта углубленного высшего образования ОСВО 7-06-0533-06-2023 и учебного плана БГУ № М54а-5.4-114/уч. от 11.04.2023.

Практика направлена на закрепление знаний и умений, полученных в процессе теоретического обучения в магистратуре, овладение навыками исследования актуальных научных и прикладных проблем, решения социально-профессиональных задач, применения инновационных технологий и др.

Основные **цели практики** – овладение магистрантами практическими навыками, умениями и их подготовка к самостоятельной профессиональной деятельности по получаемой специальности.

Основными **задачами** производственной практики являются: освоение и закрепление знаний и умений магистрантов, полученных в процессе теоретического обучения, апробация возможности самостоятельной работы будущего специалиста в условиях конкретного производства, оптимизация реальных технологических и иных процессов, составление технических заданий на проектирование и оформление проектной документации, освоение технологии проектирования объектов и методов принятия проектных решений, подготовка материалов для написания магистерской диссертации.

Образовательная программа высшего образования второй ступени с углубленной подготовкой специалиста, обеспечивающая получение степени магистра, предусматривает организацию практики по специальности в организациях резидентов ПВТ и других ИТ-компаниях, учреждениях органов государственного управления, проектно-конструкторских и научно-исследовательских организаций. Практика направлена на закрепление знаний и умений, полученных в процессе теоретического обучения в магистратуре, овладение навыками работы над масштабными проектами в ИТ-компаниях, планирования профессиональной деятельности, составления технических заданий и оформления технической документации, работы в команде, применения знаний в области информационных технологий в социальной, научной и иных сферах, реализации инновационных проектов и преподавания математических дисциплин.

Производственная практика предполагает развитие профессиональных компетенций, значимых для практической деятельности будущего специалиста, приобретение им производственных навыков при выполнении конкретных производственных функций, его участия в производственной деятельности. Основными принципами проведения производственной практики студентов

являются: интеграция теоретической и профессионально-практической, учебной и научно-исследовательской деятельности студентов. Тематика производственной практики согласуется с профилем специальности.

Перечень планируемых результатов обучения при прохождении практики, соотнесенных с планируемыми результатами освоения образовательной программы, включает компетенции, формируемые в результате прохождения практики, которыми студент должен овладеть в ходе выполнения программы.

В результате прохождения производственной практики магистрант должен **знать:**

- правила осуществления работ и требования техники безопасности;
- научную тематику профильных учреждений, на базе которых организована практика;
- основные методы, способы и средства получения, хранения, переработки информации;
- пакеты прикладных программ и средства компьютерной графики для решения профессиональных задач;
- современные методологии, формализованные языки и нотации, программные средства для построения и описания моделей процессов, данных, объектов;
- документацию по разработке, модернизации, внедрению, сопровождению, эксплуатации информационных систем;
- государственные языки Республики Беларусь.

уметь:

- адаптироваться к новым ситуациям социально-профессиональной деятельности, реализовывать накопленный опыт, свои возможности;
- на практике использовать результаты научных исследований;
- пользоваться глобальными информационными ресурсами;
- разрабатывать практические рекомендации по использованию научных исследований, планировать и проводить экспериментальные исследования, исследовать патентоспособность и показатели технического уровня разработок программного обеспечения информационных систем, разрабатывать научно-техническую документацию;
- анализировать требования заказчика по использованию информационных систем и документировать результаты;
- применять современные методологии, формализованные языки и нотации, программные средства для построения и описания моделей процессов, данных, объектов;
- выявлять и описывать бизнес-процессы предприятия;
- разрабатывать документацию по разработке, модернизации, внедрению, сопровождению, эксплуатации информационных систем;
- превращать информацию в знания, их применять и делиться полученными результатами.

иметь навык (практический опыт):

- применения технических устройств и компьютеров, использования баз данных, пакетов прикладных программ и средств компьютерной графики для решения профессиональных задач;
- работы в команде;
- самостоятельной научно-исследовательской деятельности (включая анализ, сопоставление, систематизацию, абстрагирование, моделирование, проверку достоверности данных, принятие решений и др.);
- формирования и аргументации собственных суждений и профессиональной позиции;
- междисциплинарного подхода при решении проблем;
- использования технических устройств, управления информацией и работы с компьютером;
- устной и письменной коммуникации для работы в междисциплинарной и международной среде.

Место проведения практики

Практика организуется на промышленных предприятиях либо в научно-исследовательских организациях.

В качестве баз для проведения практики выпускающими кафедрами выбираются организации независимо от форм собственности, соответствующие профилю подготовки специалистов в высших учебных заведениях.

При выборе базы практики используются объективные критерии, оценивающие наиболее важные стороны предприятия как базы практики студентов. К таким критериям относятся: обеспечение квалифицированным руководством, оснащенность предприятия современным оборудованием и применение прогрессивных и альтернативных методик.

Магистрант проходит практику на кафедрах БГУ, в организациях-резидентах ПВТ и других ИТ-компаниях, учреждениях органов государственного управления, проектно-конструкторских и научно-исследовательских организациях.

Примерный перечень организаций, преимущественно базовых, организаций-заказчиков кадров, следующие:

ИООО "ЭПАМ Системз", СООО "ХайКВО Солюшенс", ИПУП "АйБиЭй АйТи Парк", ОАО "Интеграл", ООО "СолбегСофт", ООО "Дуал Лаб Бел", ООО "Аристок Системз", ООО "Аристок Системз", ГУ "Научно-практический центр Государственного комитета судебных экспертиз Республики Беларусь, ООО "Веб пространство", ИУНПП "САМСОЛЮШНС", ООО "НетКрэкерБел", ООО "СКЭНД", ООО "Орион Софт", ООО "Б1 Аудиторские услуги" (ООО "Эрнст энд Янг"), ООО "Китайско-белорусский Высокотехнологичный аэрокосмический центр исследований и разработок", ООО "Атомикус", ООО "СофтТеко", ООО "БИВИАР Партнес", ООО "АртисМедиа", ЗАО "Альфа-банк", ГУО "Острошицко-Городокская средняя школа", Управление по образованию администрации

Заводского района г.Минска, ГУО "Колодищанская средняя школа" и другие.

В силу наличия учебной, научно-исследовательской и производственной базы, в отдельных случаях практика может проходить на кафедрах и в лабораториях механико-математического факультета БГУ.

Магистранты дневной формы обучения могут проходить практику в организациях по месту распределения.

Производственная практика проводится в 8 семестре очной формы и заочной формы обучения. Продолжительность практики составляет 8 недель, трудоемкость – 12 зачетных единиц.

Форма промежуточной аттестации – дифференцированный зачет.

EXPLANATORY NOTE

The program of research internship is a part of the educational program of Master's degree, implemented in full-time form of education in the specialty 7-06-0533-06 "Mechanics and mathematical modeling" (profilization: theoretical and applied mechanics).

The program is based on the educational standard of advanced higher education ESHE 7-06-0533-06-2023 and the curriculum of BSU № M54a-5.4-114/уч. от 11.04.2023.

The internship is aimed at consolidating the knowledge and skills acquired in the process of theoretical study in the Master's program, mastering the skills of researching actual scientific and applied problems, solving socio-professional problems, applying innovative technologies, etc. The internship is aimed at strengthening the knowledge and skills acquired in the process of theoretical study in the Master's program.

The main aims of the internship are acquisition by master students of practical skills, abilities and their preparation for independent professional activity on the received specialty.

The main objectives of the internship are: mastering and consolidation of knowledge and skills of master students, obtained in the process of theoretical study, approbation of the possibility of independent work of the future specialist in the conditions of specific production, optimization of real technological and other processes, preparation of technical tasks for design and design documentation, mastering the technology of designing objects and methods of making design decisions, preparation of materials for writing a master's thesis.

The educational program of higher education of the second level with advanced preparation of a specialist, providing the Master's degree, provides for the organization of the internship on the specialty in HTP resident organizations and other IT companies, institutions of public administration, design and research organizations. The internship is aimed at consolidating the knowledge and skills acquired during theoretical study in the master's program, mastering the skills of working on large-scale projects in IT-companies, planning professional activities, drafting technical tasks and technical documentation, working in a team, applying knowledge in the field of information technologies in social, scientific and other spheres, implementing innovative projects and teaching mathematical disciplines.

The internship involves the development of professional competencies relevant to the practical activity of the future specialist, the acquisition of production skills in the performance of specific production functions, his participation in production activities. The main principles of the internship are integration of theoretical and professional-practical, educational and research activities of students. The internship is coordinated with the profile of the specialty.

The list of planned training results during the internship, correlated with the planned results of mastering the educational program, includes competencies formed as a result of the internship, which the student must master in the course of the program.

As a result of The internship the master's student should

know:

- rules of work and safety requirements;
- scientific topics of specialized institutions, on the basis of which the internship is organized;
- basic methods, ways and means of obtaining, storing and processing information;
- application software packages and computer graphics tools for solving professional tasks;
- modern methodologies, formalized languages and notations, software tools for building and describing models of processes, data, objects;
- documentation on development, modernization, implementation, maintenance and operation of information systems.

be able to:

- adapt to new situations of socio-professional activity, realize the accumulated experience and their capabilities;
- use the results of scientific research in The internship;
- use global information resources;
- develop practical recommendations on the use of scientific research, plan and conduct experimental research, investigate the patentability and technical level indicators of information systems software developments, develop scientific and technical documentation;
- analyze customer requirements for the use of information systems and document the results;
- apply modern methodologies, formalized languages and notations, software tools to build and describe models of processes, data, objects;
- identify and describe business processes of the enterprise;
- develop documentation on the development, modernization, implementation, maintenance, operation of information systems;
- turn information into knowledge, apply it and share the results obtained.

have a skill (practical experience):

- application of technical devices and computers, use of databases, application program packages and computer graphics tools to solve professional tasks;
- teamwork;
- independent research activity (including analysis, comparison, systematization, abstraction, modeling, data validation, decision-making, etc.);
- formation and argumentation of own judgments and professional position;
- interdisciplinary approach in problem solving;
- use of technical devices, information management and computer skills;

- oral and written communication to work in an interdisciplinary and international environment.

The internship location

The internship is organized at industrial enterprises or research organizations.

As the bases for The internship graduate departments choose organizations, regardless of ownership, corresponding to the profile of training of specialists in higher education institutions.

When selecting the internship base, objective criteria are used to evaluate the most important aspects of the enterprise as a base for the internship of students. Such criteria include: the provision of qualified management, the enterprise is equipped with modern equipment and the use of progressive and alternative methods.

The internship is conducted at the BSU departments, HTP resident organizations and other IT companies, institutions of state administration, design and research organizations.

An approximate list of organizations, mainly basic, organizations-employers of personnel, is as follows:

EPAM Systems JLLC, HaiKVO Solutions JLLC, IBM IT Park IPUP, Integral OJSC, SolbegSoft LLC, Dual Lab Bel LLC, Aristek Systems LLC, Aristek Systems LLC, State Institution “Scientific and Practical Center of the State Committee of Forensic Examinations of the Republic of Belarus”, LLC “Web Space”, IUNPP “SAMSOLUSHNS”, LLC “NetCrackerBel”, LLC “SCEND”, LLC “Orion Soft”, B1 Audit Services LLC (Ernst & Young LLC), China-Belarusian High-Tech Aerospace Research and Development Center LLC, Atomikus LLC, SoftTeko LLC, BIVIAR Partners LLC, ArtisMedia LLC, Alfa Bank CJSC, Ostroshitsko-Gorodok Secondary School, Education Department of Zavodskiy District Administration of Minsk city, Kolokoloshenskiy State Educational Institution, Minsk City State Educational Institution. Minsk, Kolodishchanskaya secondary school and others.

Due to the availability of educational, research and production base, in some cases the internship can be held at the departments and laboratories of the Faculty of Mechanics and Mathematics of BSU.

The internship can take place in organizations at the place of allocation.

The internship is conducted in the 8th semester of full-time and part-time study. The internship duration is 8 weeks, labor intensity of the internship is 12 credit units.

The form of interim certification is differentiated credit.

INTERNSHIP CONTENT

The internship is aimed at consolidating the knowledge and skills acquired during theoretical study in the Master's program, mastering the skills of working on large-scale projects in IT-companies, planning professional activities, drafting technical tasks and technical documentation, working in a team, applying knowledge in the field of information technology in social, scientific and other spheres, implementing innovative projects and teaching mathematical disciplines.

The research internship is closely connected with educational and research work of the Master student. The content of the internship is determined by the topic of the master's thesis, as well as the need to study the methods of solving problems corresponding to the profile of the master's specialty.

During the internship *master's students study*:

- organization of production, research, design and (or) rationalization work in the organization;
- results of scientific research conducted in the field of mathematics, mechanics, informatics in the organization and its subdivisions;
- state of modern information technologies and their use in various spheres of activity;
- mathematical methods used in informatics, economics, financial activities;
- equipment, apparatus, electronic-computer technology, control and measuring instruments and tools used in production, in the educational process, scientific research and practical work;
- methodologies and technologies of system and business analysis for creating services or applications;
- best practices of the best specialists of the organization;
- creating and ensuring safe and healthy working conditions when working with computing equipment;
- marketing in the sphere of production of software products and information services.

In the internship masters students *develop and research*:

- mathematical structures and models in information, economic, financial systems;
- algorithms and methods of solving problems within the framework of the obtained mathematical models;
- information technologies and software for solving the obtained tasks;
- automated control systems as a whole and their separate modules;
- neural networks and machine learning models for solving a wide range of applied problems;
- databases and database management systems;
- computer networks and technologies.

All tasks assigned to the internship should be performed independently by the intern in close cooperation with the internship supervisor and the staff of the organization.

Independent work of the trainee should include:

- study of modern mathematical methods, information technologies, software and hardware on the subject of the internship;
- conducting scientific research to improve and simplify technologies, search for new approaches and methods of solving the problems under consideration;
- carrying out computational experiments to compare the effectiveness of used and proposed methods, technologies and algorithms.

By agreement with enterprises or organizations engaged in the development of modern mathematical methods and information computer technologies, it is possible to hold seminars at these enterprises or organizations with the duration not exceeding 4 hours each.

Possible list (as an example) of the internship tasks for master students of the specialty “Mechanics and Mathematical Modeling”:

- study the design of the technical system under consideration;
- develop a three-dimensional model of the system under consideration;
- develop a finite element mesh and optimize it;
- set the boundary conditions;
- make the settings of numerical analysis;
- analyze the obtained results;
- propose ways to optimize the considered structure from the point of view of increasing its reliability and durability.

INFORMATION AND METHODOLOGICAL COMPONENT

Requirements for the content and design of the individual task and the internship report

Before the internship, the internship supervisor from the department makes an individual task for the master student. The individual task is entered in the internship diary and signed by the supervisor. A clearly formulated task allows to easily control the course of the internship, to make changes promptly with minimal deterioration in the quality of its passage.

Individual task should correspond to the specialty and specialization of students and reflect the main directions of development of mathematics and mechanics. The topic of the individual task should be chosen and formulated in such a way that:

- be relevant, i.e. the research and development could have scientific and practical significance;
- have internal integrity, i.e. not consist of many weakly connected parts;
- the work on the assignment required justification of the decisions made;
- the research and development proposed in the assignment was feasible during The internship;
- fulfillment of the assignment in full allowed to obtain weighty, justified and defensible results.

Typically, the task from the department includes the following items:

1. Make a characteristic of the enterprise: indicate its form of ownership, direction of activity (without disclosing information constituting commercial secrets), build a model of organizational structure.
2. To formulate the mission and vision of the enterprise, strategic objectives, which make up the mission.
3. Identify the main and auxiliary business processes, describe them and the links between them.
4. describe the use of information technology in business processes: computer hardware, information systems, application software, programming languages, modeling/design tools used in the enterprise as a whole.
5. Characterize the business unit/project within which individual tasks are performed: line of business, objectives, hierarchy of objectives. Formulate business rules and business requirements that reflect the unit/project goal hierarchy.
6. Describe the computer equipment of the unit/project: hardware, operating systems, information systems, application packages, programming languages. Analyze the use of IT within the unit/project and its role in meeting business rules.
7. Prepare a brief overview of software products used in the enterprise and a complete overview of software products used in the department where the student is doing the internship (general characteristics, functions, required software and hardware, etc.). Has the enterprise information systems software been specially ordered, or is software adapted to the specific conditions of the enterprise used? How often and under what conditions is the software updated?

8. Formulate the individual tasks set by the head of the internship to the master student, indicate the position or position in terms of which these tasks are performed, the place of the tasks in the operational activities of the unit or in the project.

9. Formulate the results of individual tasks: what was done, what means were used (methodologies, technologies, OS, packages, programming/modeling languages, literature).

10. Summarize the results of the internship: what knowledge, skills, abilities, acquired in the classroom and independently, were used, what new things were learned, what wishes to study in the master's program appeared as a result of The internship.

As a rule, tasks related to the Master's student's participation in production are set by the supervisor from the enterprise. Also individual task can be closely related to the Master's thesis.

To perform individual task it is recommended to use modern literature on applied system and business analysis of the enterprise. When describing the activities of the organization it is recommended to use IDEF0, ARIS methodologies, when building models and diagrams - UML modeling language, BPMN notations, etc.

The internship supervisor determines the list of recommended literature for solving the tasks given directly to the internship.

During the last week of the internship the student makes a written report on the implementation of The internship program. The report should contain explanatory illustrations, schemes, drawings and should be 7-14 pages in length.

The report must be signed by the student, the direct supervisor of the internship from the organization and approved by the head (deputy head) of the organization. At the end of the internship, the direct supervisor of the internship from the organization draws up a written review of the student's internship.

The completed diary and report are presented for review to the head of the internship from the enterprise, organization or institution, who gives a conclusion on its content. The review should be certified by the seal of the enterprise (organization or institution).

The internship report shall contain:

- title page;
- task for research the internship;
- table of contents (table of contents)
- introduction;
- the main part of the report;
- conclusion;
- list of used sources;
- appendices.

The form of the cover page of the student's report on the internship is given in Appendix 1.

The introduction should reflect:

- the purpose, place and time of the internship (weeks);

- the sequence of the internship, the list of works performed during the internship.
- The main part of the report should include:
- description of the organization of work during the internship;
 - description of the work done according to the sections of the internship program and individual task;
 - description of practical tasks solved by the student during the research internship;
 - analysis of the most complex and characteristic cases studied by the student;
 - indications of difficulties that arose during the internship;
 - presentation of controversial issues that arose during the internship and their solution;
 - description of job descriptions at the place of the internship.
- The conclusion should contain:
- description of the skills acquired during the internship;
 - characterization of the legal and regulatory framework, information and software products necessary for the research internship;
 - suggestions and recommendations made by the student during the internship.

The internship report is typed, usually using the Word text editor. It is recommended to use TimesNewRoman type fonts with the size of 14 points. The number of characters per line should be 60-70, line spacing - 18 points (1.5 typewriter intervals), the number of text lines per page - 39-40. The following margin sizes are recommended: upper and lower margins - 20 mm, left margin - 30 mm, right margin - 15 mm.

It is allowed to use computer capabilities to emphasize definitions, terms, important features, using different font type: italic, bold, italic semi-bold, highlighting by means of frames, spacing, underlining, etc.

It is forbidden to use text editing and formatting tools (compaction, correction of spacing, margins, etc.) in order to change the volume of the work, calculated in pages, to a greater or lesser extent.

The internship calendar and thematic plan

The internship is at the beginning of the fourth semester, in the second year of Master's studies. The internship duration is 8 weeks. The labor intensity of the internship is 12 credit units.

On the eve of the beginning of the internship, a master student attends the organizational meeting, which is conducted by the head of the internship from the department.

On the first working day of the first week of the internship the graduate student must arrive at the enterprise for the internship. There the master gets acquainted with the team, conditions and organization of work in the organization, work schedule. Passes briefing on safety at the responsible for safety in the organization with mandatory documentation in the safety log. The internship supervisor from the organization is appointed, the work schedule is agreed upon, the workplace for the internship is allocated.

There is a preliminary acquaintance with the work of the organization. When using equipment that is not assigned to the workplace of the trainee, a calendar plan of movement to workplaces, which is agreed with the staff of the organization.

The first week, in general, is allocated to agree with the supervisor a list of real practical, research and experimental work, to the performance of which the intern will be involved, to determine the literature and equipment necessary for their implementation. Individual tasks of the master's student are identified and formulated. Further it is recommended to select and study literature, reports and other materials on the subject of work. Consultations with the supervisor and specialists of the organization.

Then the intern chooses methods of solving individual tasks of a master's student, develops technologies for the fulfillment of these tasks, as well as performs the accompanying individual tasks, research and experiments.

At the final stage of the internship the master student draws up the necessary documentation on the internship.

It is recommended to adhere to the following calendar schedule of the internship, presented in Table 1.

Table 1.

The internship week number	The internship content
1	<p>Arrival at the enterprise. Safety briefing, its documentation. Getting acquainted with the head of the internship. Agreement of the mode of work. If necessary, drawing up a plan of movement to workplaces, coordination of the plan with employees.</p> <p>Getting acquainted with the work of the organization as a whole. Drawing up a characterization of the enterprise (mission, vision, hierarchy of goals).</p> <p>Identification of the main and auxiliary business processes of the enterprise. Determination, together with the internship supervisor, of individual tasks related to the master's student's participation in production or to the topic of the master's thesis. Formulation of individual tasks of a master's student, identification of links between them. Characterization of the unit/project, within the framework of which the individual tasks of the Master's student are performed.</p>
2-3	<p>Selection of educational, scientific, methodological literature and internal documentation necessary for the fulfillment of individual tasks of a master's student. Description and analysis of the use of information technologies in business processes of the unit/project.</p> <p>Fulfillment of individual tasks of a master's student. Selection of research methods. Consultation with staff members, if necessary.</p>

4-6	Fulfillment of individual tasks of a master student. Development of technologies of practical fulfillment of tasks. Consultations with the head of the internship on the selected methodologies and developed technologies. Preparing a review of software products used at the enterprise and in the department/project where the internship is conducted.
7-8	Fulfillment of individual tasks of a master student. Formulation of the results of individual tasks: what was done, what means were used (methodologies, technologies, OS, packages, programming / modeling languages, literature). Writing of the report and finalization of The internship diary.

Methodological guidelines for students and the internship supervisors

On the eve of the internship, an organizational meeting is held with master's students, where the goals and objectives of the internship are explained, the necessary documentation is given: the program of the internship, the voucher (direction to the organization), the calendar plan of the internship.

Direct management of the research internship of students is carried out from two sides:

- from the side of the university is the head of The internship from the department,
- on the part of the host organization is a qualified specialist appointed by the head of the internship by the order of the institution.

The internship supervisor from the department during the internship controls the arrival and departure of students, assesses the organization of the internship and the conditions in which it takes place, provides the necessary scientific and methodological assistance to students through conversations, consultations, assesses the compliance of the provided students' jobs to the tasks of the internship and their work discipline, checks the student's report on the internship and allows him to defend.

The internship supervisor on the part of the host organization provides day-to-day management and control over its progress; acquaints the student with the rules of internal regulations in force in the organization, his job duties; determines the sequence and order of the internship, for which he makes with the internship calendar plan, providing for the implementation of the entire program in the working conditions of the enterprise; checks and evaluates the report on the internship; gives a characteristic of the internship.

The main form of training during the internship is the independent work of a master student, which consists of the following elements: studying theoretical material; performing specific tasks; conducting research and computational experiments; formulating conclusions and recommendations.

When working independently, a master student should pay attention to the rationale and statement of the organization's task, to study the essence of the problems and make

an attempt to develop proposals for their implementation. It is recommended to take an active part at all stages of the work, to collect the necessary material for writing a qualification work.

Before the internship, the student should study the internship program and refer to the relevant legal normative materials in order to be prepared to perform the assignments given by the internship supervisor and to solve specific practical issues. Both in preparation and during the internship, the student should refer to legislation, academic and scientific literature, current regulatory documentation.

When studying theoretical material, one should proceed to the next section only after a correct understanding of the previous one. It is useful to keep a list of literary sources with a brief annotation of each source. It is recommended to widely use the search for the required information in the Internet, saving the necessary web-addresses. Conclusions obtained during the study of theoretical material are formalized in the form of a review with obligatory references to the sources of information.

The fulfillment of specific tasks is of great importance, as it accustoms the student to the necessary order, discipline, proper planning of working time. The supervisor should specify the time allotted for the assignment, the type of the required result. The student should not be overloaded with assignments and should not be given several assignments at the same time.

When conducting research, computational and other experiments, the student's ability to apply the acquired knowledge for the first time considered problems. The supervisor should accurately determine the degree of difficulty in solving the problem and the capabilities of the trainee. The research or experiment should be concluded with conclusions and recommendations on the application of the results obtained.

If during the course of the work the student has questions that cannot be solved by him/herself, he/she should contact the supervisor for advice. The student should specify exactly what he/she is experiencing difficulty, the nature of the difficulty and the proposed plan of action.

Functions of the internship supervisor from the department

The internship supervisor from department of the BSU mechanics and mathematics faculty is obliged to:

- check the profile of the master student's intended work at the enterprise planned for the internship for compliance with the specialty;
- to inform the master students due time about the terms and stages of the internship, normative documentation accompanying it;
- formulate individual task on the internship taking into account the specifics of the tasks set at the enterprise;
- check the current implementation of the internship program;
- advise students on the internship, report writing;
- check the report on the internship;
- conduct the defense of the report.

Current control is carried out by the head of the internship from the department at the following stages: arrival at the enterprise, the end of the first week, the end of the third week, the end of the seventh week of the internship.

Functions of the internship supervisor from the enterprise

The internship supervisor from the enterprise is obliged:

- to formalize the enrollment of students in the internship by an order;
- ensure safe working conditions for students and document safety briefings;
- provide students with workplaces and necessary normative and reference materials in accordance with the internship type;
- organize timely progression of students to their workplaces in accordance with the recommendations of the internship program;
- advise students
- assist in studying the current normative material, in selecting and analyzing the material;
- monitor the implementation of the internship program;
- at the end of the internship to check the reports and prepare a characteristic for each student, which should reflect: the timeliness of students' attendance at the internship, mastering the skills of practical work, compliance with labor discipline, etc.

Responsibilities of the student during the internship

1. Prior to the internship to receive from the head of the internship from the department:

- the internship diary;
- individual task in accordance with the internship program;
- assignment for the internship;
- contract for the internship;
- a travel certificate (for students studying at the expense of the republican budget, if the internship is outside Minsk).

2. To arrive in due time to the place of the internship, confirming the arrival by the signature of the head of the organization or the head of the personnel service, certified by a stamped seal.

3. Under the control of the direct head of the internship from the organization to carry out the internship program (individual task), reflecting the progress of work in the section "Brief description of the work performed" of the internship diary.

4. During the last week of the internship to make a written report on the implementation of the internship program (individual task). The report must be signed by the student, the direct supervisor of the internship from the organization and approved by the head of the organization or his/her deputy.

5. At the end of The internship to receive a written review in the diary from the direct supervisor of the internship from the organization about the internship.

6. Confirm the departure from The internship place with a corresponding mark in the diary.

7. To pass the differentiated credit on the internship, having given to the head of the internship from department the filled diary and other reporting documentation.
8. Submit the diary and report to the department.

Summarizing the Internship

At the end of the internship, the direct supervisor of the internship from the organization draws up a written review of the internship of the master student. The review should contain a description of the work done by the master student, a general assessment of the quality of his professional training, the ability to contact people, analyze the situation, work with statistical data, etc.

The mid-term certification of the results of the internship is carried out in the form of differentiated credit during the first two weeks after the internship in accordance with the schedule of the educational process.

Differential credit is accepted if the student has the mandatory reporting documentation which is a completed diary of the internship with a review of the direct supervisor of the internship from the organization and a report on the implementation of the internship program. When assessing the results of the student's work on the internship, the feedback on the work of the student's supervisor from the organization is taken into account. The evaluation criteria are the relevance of the topic, reliability of the results obtained, the degree of independent execution of tasks, the amount of work done.

BELARUSIAN STATE UNIVERSITY
MECHANICS AND MATHEMATICS FACULTY
Department of Theoretical and Applied Mechanics

ADMITTED FOR DEFENSE
The internship supervisor from the faculty
S.M. Bosikov

«__» 20__г.

REPORT
on passing the internship

Master's student in specialty
7-06-0533-06 Mechanics and mathematical modeling
Profiliation: Theoretical and applied mechanics

The internship supervisor from the organization
Director of “MAX” Ltd.

I.I. Ivanov

P.P. Petrov

Minsk 20__