

MINISTRY OF SCIENCE AND HIGHER EDUCATION
RUSSIAN FEDERATION
FEDERAL STATE AUTONOMOUS EDUCATIONAL
INSTITUTION OF HIGHER EDUCATION
NORTH CAUCASIAN FEDERAL UNIVERSITY

METHODOLOGICAL INSTRUCTIONS
after completing industrial training
RESEARCH WORK / НАУЧНО-ИССЛЕДОВАТЕЛЬСКАЯ РАБОТА
for students in the field of study
02.04.01 Mathematics and Computer Science
direction (profile)
"Training Program for Electronic Information"

Stavropol , 2026

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INTRODUCTION

Student internships at the North Caucasus Federal University are an integral part of the higher education program and are conducted in accordance with the approved curricula and schedule of the educational process in order to enable students to acquire professional work skills, deepen and consolidate the knowledge and competencies acquired during theoretical training.

The guidelines are compiled in accordance with the program of industrial practice research work for students in the field of study 02.04.01 Mathematics and computer science, focus (profile) « Training Program for Electronic Information » and contain goals, objectives, requirements for completing this practices, recommendations for preparing publications.

GOALS AND TASKS PRACTICES

The objectives of industrial practice research work in the field of training 02.04.01 Mathematics and computer science are:

- are consolidation And deepening theoretical knowledge;
- development of professional competencies related to the use of modern methods of processing and interpreting information in scientific research activities, with the organization of scientific and applied research, and the presentation of the results of scientific activities;
- developing students' professional skills in the application of modern mathematical methods and software to solve problems in science, technology, economics and management and the use of information technologies V design and engineering, management and financial activities in organizations, institutions and enterprises of the city and region.

Tasks practices are:

- professional orientation of students, formation of a complete understanding of their profession;
- fostering responsibility and independence in the performance of duties in primary positions in the field of application of modern mathematical methods and information technologies;
- development of practical skills in organizing work in the field of application of modern mathematical methods and information technologies, writing scientific publications, inventions, abstracts of presentations at conferences of various levels, preparation of scientific documentation .

REQUIREMENTS TO RESULTS DEVELOPMENT PRACTICES

Industrial internship research work in the field of study 02.04.01 – Mathematics and Computer Science is an integral part of the core educational program of higher education. Requirements for organizing industrial internships are defined by the Federal Educational Standard of Higher Education in the field of study 02.04.01 Mathematics and Computer Science, focus (profile) " Training " Program for Electronic Information ».

The organization of industrial practice and research work is aimed at ensuring the continuity and consistency of students' acquisition of competencies in the field of professional activity in accordance with the requirements for the master's level of training.

IN result passages practices student must:

know:

- basic principles, laws and methods of mathematical and computer sciences;
- methods research And modeling applied mathematical problems;
- modern informational And computer technologies.

be able to:

- formalize the objectives tasks, work with special literature, to involve the necessary computing technologies;
- apply methods of mathematical modeling in the field of professional activity;
- to use informational And computer technologies to solve the assigned applied problems;
- apply mathematical apparatus V specific subject areas ,
- to choose And use standard packages applied program For solutions practical tasks.

own:

- mathematical, statistical And quantitative methods for solving typical organizational and managerial problems;
- methods of mathematical and algorithmic modeling in solving applied problems;
- skills in working with search engines and basic software packages.

SCROLL DEVELOPED COMPETENCIES

The internship process is aimed at developing the following competencies:

- is able to organize and manage the work of a team, developing a team strategy to achieve the set goal (UK-3).
- is able to analyze and take into account the diversity of cultures in the process of intercultural interaction (UK-5).
- is able to conduct patent research, determine the forms and methods of legal protection and defense of rights to the results of intellectual activity, manage rights to them to solve problems in the field of development of science, engineering and technology (PC-4).
- is able to participate in the management of projects for the creation of information systems and software packages at the stages of the life cycle (PC-8).
- is able to take into account knowledge of the problems and trends in the development of the software market in professional activities (PC-9).

RIGHTS AND RESPONSIBILITIES STUDENTS

Before the start of the internship, the graduating department holds a meeting of students, on which are explained goals, tasks And order completion of the

internship, a date for arrival at the internship base is set, requirements for the internship report and the procedure for its defense are communicated.

Before beginning practices student must:

- appear at the appointed time for the general organizational meeting (briefing);
- study provided program practices materials. During the internship, the student must:
 - make up individual plan;
 - maintain contact with the university internship supervisor on the designated days, and in the event of any unforeseen circumstances or uncertainties, report them immediately;
 - strictly observe rules security labor And techniques security;
 - study the regulatory and legal acts in force in the division their functional purpose, regime work, office work, the structure of this organization;
 - participate in the preparation and implementation of planned activities provided for by the internship program;
 - carry out individual official tasks (assignments) of the internship supervisor, during which strive to acquire skills in establishing business contacts with employees of the institution;
 - consolidate acquired theoretical knowledge and acquire practical work skills;
 - comply with the daily routine and work schedule established in the unit;
 - Keep a daily record of the implementation of the practice program in a diary and accumulate material for compiling a report.

RESPONSIBILITIES MANAGER PRACTICES FROM UNIVERSITY AND ENTERPRISE

Internship research work is carried out in scientific departments and laboratories of the university, in state institutions and is carried out in the form of individual independent work under the guidance of a scientific supervisor and a supervisor from the research object.

Direct supervision of students' internships is carried out by the internship supervisor from the organization, who:

- provides conditions for students to complete the internship program and individual assignments;
- creates the necessary conditions for obtaining information for the purpose of implementing the internship program;
- provides assistance to students in collecting, systematizing and analyzing information in accordance with the program and individual assignments;
- controls execution students tasks on practice, keeping a diary, drawing up a report and observing the internal regulations and safety rules established in the organization;
- By at the end practices checks diary And report By practice;
- In the internship diary, the student receives feedback on the professional knowledge, skills and abilities acquired, his or her discipline, diligence and

initiative during the internship.

Each student is assigned an internship supervisor by the department, with whom the student is required to maintain contact, inform them about the progress of the internship, and report any difficulties or problems that arise.

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Supervisor practices from departments on basis programs practices:

- issues to the students assigned to him practical assignment in accordance with the approved practical program;
- together With leader from organizations controls students keeping practice diaries;
- has help students By compilation calendar plan for implementing the internship program;
- provides recommendations on the procedure for completing the internship and on completing the individual assignment;
- recommends the main one And additional literature;
- conducts individual consultations;
- has students scientific and methodological help, related with practice and preparation of a report based on its results;
- leads control process passages practices;
- In the internship diary, the student receives feedback on the professional knowledge, skills and abilities acquired, his or her discipline, diligence and initiative during the internship.

STRUCTURE AND CONTENT PRACTICES. TASKS, SCHEDULE AND THE PROCEDURE FOR THEIR IMPLEMENTATION

Thematic And calendar plan practices

No.	Stage passages practices	No. semesters	Note
1.	Study of educational and methodological mothers of alov.	3	Getting to know the structure divisions informational technologies organizations .
2.	Collection, processing And systematization actual And literary material, completing assignments.	3	Selecting a research topic direction training; compiling a review of articles on the research topic.
3.	Preparation, presentation of scientific articles and testing of results scientific research at conferences	3	Search opportunities publication of the results of scientific research.
4.	Protection report, crediting with assessment.	3	
5.	Study of normative and technical documentation, educational and methodological mothers of alov.	4	Study of scientific research of the scientific departments of the faculty
6.	Collection, processing And systematization actual And literary material, completing assignments.	4	Collection, processing, systematization and analysis of factual and literary material for the organization of scientific research activities, implementation of educational tasks.
7.	Preparation, presentation of scientific articles and testing of results scientific research .	4	Search opportunities publication of scientific research results
8.	Protection report, crediting with assessment.	4	

Tasks, allowing evaluate knowledge, received on practice

Controlled competencies or parts thereof (code competencies)	Formulation tasks	
UK-3 UK-5 PC-4 PC-8 PC-9	Exercise 1	Apply methods mathematical And algorithmic modeling V relevant area (develop a model and evaluate her adequacy And efficiency).
	Exercise 2	Apply computing and computer technologies For solutions scientific tasks (to develop a model and evaluate its adequacy And efficiency).
UK-3 UK-5 PC-4 PC-8 PC-9	Exercise 1	Use methods of mathematical and algorithmic modeling to solve applied problems in the scientific and technical sphere, economics, business and etc. (to develop model And evaluate her adequacy and effectiveness).
	Exercise 2	Develop mathematical model scientific or management direction and assess its adequacy.

Tasks, allowing evaluate skills And skills, received on practice

Controlled competencies or parts thereof (code competencies)	Formulation tasks	
UK-3 UK-5 PC-4 PC-8 PC-9	Exercise 1	Apply methods mathematical And algorithmic modeling V relevant area (develop a model and evaluate her adequacy And efficiency).
	Exercise 2	Apply computing and computer technologies For solutions scientific tasks (to develop a model and evaluate its adequacy And efficiency).

Controlled competencies or parts thereof (code competencies)	Formulation tasks	
UK-3 UK-5 PC-4 PC-8 PC-9	Exercise 1	Use methods of mathematical and algorithmic modeling to solve applied problems in scientific and technical fields, economics, business, etc. (to develop model And evaluate her adequacy And efficiency).
	Exercise 2	Develop mathematical model scientific or management direction And evaluate her adequacy.

Methodological recommendations By execution tasks practices

No.	Stage internship	Recommendations
1.	Study of regulatory and technical documentation, educational and methodological materials.	IN in the course passages stage to students The issues of organization and content of the practice are communicated, and an individual assignment is given. peculiarities passages research work in organizations and enterprises. Normative and technical And educational and methodological documentation corresponding to the profile of the practice. Rules design reporting documentation.
2.	Collection, processing and systematization of factual And literary material, execution tasks.	The main thing attention is given use of knowledge of fundamental mathematical disciplines For completing scientific assignments and working with factual and literary material .
3.	Preparation, preparation of scientific articles and testing of scientific research results .	Within the framework of this section, students must acquire practical skills in writing scientific articles, applications for proposed inventions and software products during their internship. Necessarily accept participation V work at scientific and technical or scientific and practical conferences of various levels. At this special attention attention is paid to issues that are assessed from a technical and

No.	Stage internship	Recommendations
		economic point of view efficiency researched question V framework master's dissertations.
4.	Defense of the report, setting differentiated for the match.	It is produced grade execution students of the internship program. Students submit internship reports.

FORM PROVISIONS REPORT BY PRACTICE, REPORT STRUCTURE

During the internship, each student completes research assignments, in which they must reflect their work. Upon completion of the internship, publications in scientific journals are provided. No publications practice does not count.

The internship report is published in scientific journals as a final document in which the student reflects on the issues of solving a specific scientific problem within the framework of the master's thesis.

To present the results of practical training in scientific research work (scientific seminar), the following procedure is recommended for posting material for submission to the department:

1. A reviewer's review of a submitted scientific article, completed on company letterhead and signed by the reviewer.
2. Published materials of a scientific article, a certificate for a software product with output data (copy) or on magnetic media.

INTERMEDIATE CERTIFICATION BY PRACTICE

During the internship, the student takes a differentiated assessment based on the results of the checkpoints. A student's eligibility for the internship assessment is based on complete and accurate (without corrections) documentation (publications, abstracts of presentations, and software product certificates).

CRITERIA EXHIBITIONS ASSESSMENTS

An " **excellent** " grade is awarded if the student has completed the entire internship program and demonstrates deep and comprehensive knowledge in the individual report defense. The student is able to apply theoretical knowledge to solving mathematical problems and implementing information technology. in practice. Freely navigates in educational and methodological literature and documentation provided in practice.

A " **good** " grade is awarded if the student has completed the internship program and demonstrates sufficient knowledge in the individual report defense. The student is

able to apply theoretical knowledge to solving mathematical problems and implementing information technology in practice. The student is fluent in the educational and methodological literature and documentation provided during the internship.

A " **satisfactory** " grade is awarded if the student has largely completed the internship program and demonstrates sufficient knowledge in the individual report defense. The student is able to apply theoretical knowledge to solving certain mathematical problems and implementing information technology in practice. They are able to navigate most of the educational and methodological literature and the documentation provided during the internship.

A " **fail** " grade is given if a student has not completed the internship program and demonstrates insufficient knowledge in the individual report defense. The student is unable to apply theoretical knowledge. For solutions mathematical tasks And implementation information technology on practice. Weak is oriented V greater parts educational and methodological literature and documentation provided in practice.

EDUCATIONAL AND METHODOLOGICAL AND INFORMATIONAL PROVIDING PRACTICE

A) main literature:

1. Kukushkina V. V. Organization of scientific research work of students (masters): a textbook in the direction of "Management" / V. V. Kukushkina. - M .: INFRA-M, 2014 .-- 264 p.: ill., table. - (Higher education. Master's program). - Stamp: Supplementary Council of the UMO. - On the title page and transl.: Electronic Library System Znanium.com. - Bibliography : pp. 259-260. - ISBN 978-5-16-004167-4

2. Ichetovkina N.M. Psychological and pedagogical practices: organization, methodological instructions, diagnostic means: teaching aid for students / N.M. Ichetovkina , T.D. Lukyanova ; Ministry of Education and Science of the Russian Federation. – Glazov: GGPI, 2014. – 112 pp.: table. – ISBN 978-5-93008-177-0; The same [Electronic resource]. URL:

<http://biblioclub.ru/index.php?page=book&id=428685>

b) additional literature:

1. Astanina S. Yu. Research work of students (modern requirements, problems and their solutions) [Electronic resource]: monograph / S. Yu. Astanina , N. V. Shestak , E. V. Chmykhova . - Electronic text data. - M .: Modern Humanitarian Academy, 2012. - 156 p. - 978-5-8323-0832-6. Access mode: <http://www.iprbookshop.ru/16934.html>

V) Internet resources:

1. https://ru.wikipedia.org/wiki/Список_операционные_систем List of operating systems

2. <http://www.intuit.ru/studies/courses/1089/217/info> Basics Microsoft Windows operating system organization

<http://www.osp.ru> (published . Open systems)

3. <http://www.computer-musem.ru> (Weekly PC- week RE and virtual computer

museum).

<https://ru.wikipedia.org/wiki> Wikipedia free encyclopedia.

4. <http://www.allmath.ru/> All mathematics is higher mathematics, applied mathematics, mathematical methods V economy, financial mathematics
<http://www.exponenta.ru/> Educational mathematical website.

APPENDICES

Appendix 1

**Ministry of Science and Higher Education of the Russian Federation
Federal State Autonomous Educational Institution
higher education
NORTH CAUCASIAN FEDERAL UNIVERSITY**

Faculty of Mathematics and Computer Science named after Professor N.I. Chervyakov
Department _____

Admitted to defense
« ____ » _____ 20 ____

Head of Department

(signature)

**INDUSTRIAL PRACTICE REPORT
RESEARCH WORK**

Practice leader from a specialized
organization:

(Full name, position)

(signature)

M.P.

Completed by:

(Full name, year, group, areas of
training/specialty, focus
(profile)/specialization, form of study)

(signature)

Practice Manager:

(Full name, rank, position)

(signature)

The report was defended with the grade _____ Date of defense _____

Stavropol, 20__

1. _____ Practice assignment
(type of practice: educational/industrial)

(name (type) of practice)

Student _____
(Full name)

Field of study/specialty _____

Focus (profile)/Specialization _____

Course, ___ Form of study, _____ Group _____

Internship duration: _____

Place of internship: _____

Internship supervisor from SKFU: _____
(Full name, place of work, position)

Practice leader from a specialized organization: _____

(indicated in case of internship in an external organization: full name, place of work, position)

List of assignments for practice

(The student's tasks are listed in accordance with the practical training program)

1. _____
2. _____
3. _____
4. _____
5. _____

Individual assignment (topic) for practice

The assignment was approved at the department meeting _____
(protocol from " ____ " _____ 20 __ , No. ____)

Date of assignment issue: " ____ " _____ 20 __ g.

Internship Supervisor from the University

_____ « ____ » _____ 20 __ g.
(signature of the manager)

The task was accepted for execution on _____ " ____ " _____ 20 __ g.
(student's signature)

2. INSTRUCTIONS ON FAMILIARIZATION WITH SECURITY REQUIREMENTS LABOR, SAFETY, FIRE SAFETY, INTERNAL RULES

(at the intern's workplace)

	Briefing completed	I have read it
according to security requirements t labor		
on safety precautions	(signature and full name of the head of practice from specialized organization or manager internships from the University, if the internship (held at the University) « » 20 G.	(signature and full name of the student) « » 20 g.
fire safety		
according to the internal labor regulations		

3. INTERNSHIP DIARY

Date	Activities completed in accordance with the practical assignment

4. Description of the work carried out during the internship

The section is filled in by the student in accordance with the specifics of the practice and assignments for practice (may contain tables, graphs, statistics, etc.)

Recommended section content:

1. Introduction
2. Sections and subsections (materials based on the results of completing assignments)
3. Conclusion
4. List of references and literature (if any)
5. Applications (if necessary).

Student questionnaire following the internship

1. Are you satisfied with the conditions of the internship?

- Yes, completely.
- Yes, basically.
- No, not completely.
- Absolutely not.

2. Are students provided with access to all necessary resources during practice? information resources?

- Yes, fully provided.
- Yes, basically provided for.
- No, it is not provided for sufficiently.
- No, not at all provided for.

3. Is the list of disciplines you studied at the university complete enough? for successful completion of the internship?

- Yes, it is completely sufficient.
- Yes, basically sufficient.
- No, it's not quite sufficient.
- Absolutely insufficient.

4. Which of the disciplines studied at the university were especially useful to you in during the internship process?

5. In which disciplines did you lack knowledge during your internship?

6. Suggestions for organizing the internship or its content

REVIEW

internship supervisor from the University

Full name of the internship supervisor from the University, position

Full name of the student-intern _____

Type of practice _____

Name (type) of practice _____

Place of internship _____

Internship period _____

Competencies developed by the student _____

—

List of skills acquired by the student _____

Characteristics of a student's work

Conclusion on the results of the internship _____

Recommended rating _____

(position) (signature) (full name)

« _____ » _____ 20 _____

REVIEW

practice manager from the organization

Name of the organization _____

Full name of the internship supervisor from the organization, position _____

Full name of the student-intern _____

Type of practice _____

Name (type) of practice _____

Place of internship _____

Internship period _____

Work functions performed by a student during internship _____

List of skills and abilities acquired by the student _____

Characteristics of a student's work

Conclusion on the results of the internship _____

Recommended rating _____

(position) (signature) (full name)

