ITMO UNIVERSITY

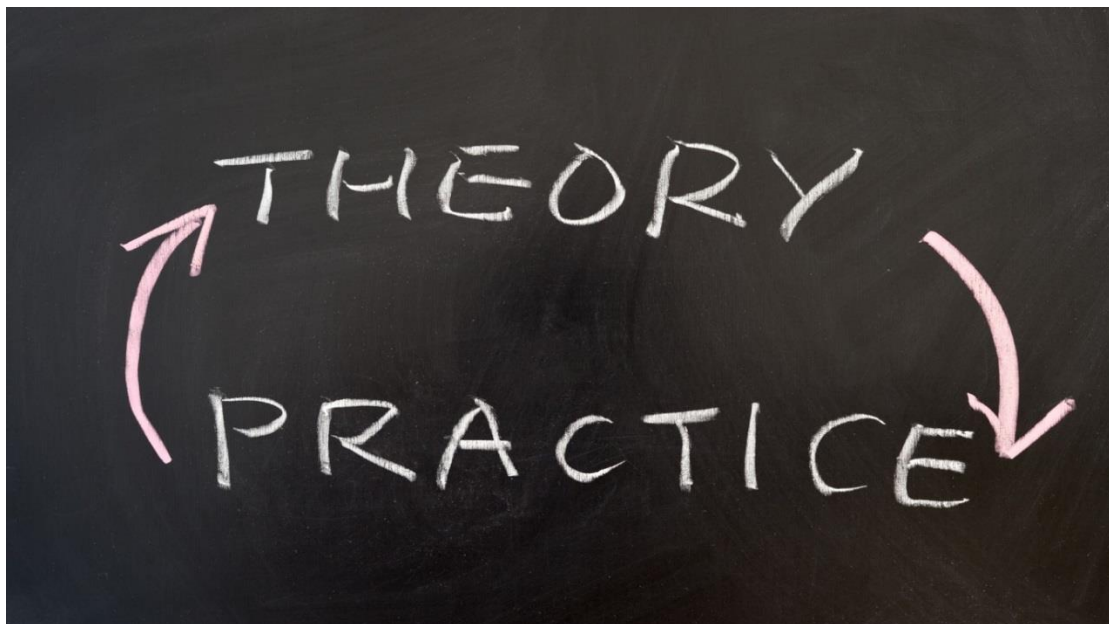# O. Pavlova, G. Korneev, A. Sergushichev, A. Filchenkov

Internship guidance and methodological advice for foreign students of ITMO University

Student handbook

Saint Petersburg
2019

MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION
ITMO University

O. Pavlova, G. Korneev, A. Sergushichev, A. Filchenkov

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Student handbook
for learners of master's degree programs
of qualification profile
"Applied Mathematics and Computer Science"
as a guidance and methodological advice

ITMO UNIVERSITY

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Reviewer: Vyatkin V., Dr. Eng. Habil., Doctor of Sciences, Department of Electrical Engineering and Automation, Aalto University (Finland).

The guidance and methodological advice on internship are drawn up in accordance with the Federal State Educational Standards of Higher Education and ITMO University Educational Standard in the field of Applied Mathematics and Computer Science.

The guidelines describe the procedure for organizing and running the internship, the requirements for reporting materials, as well as the evaluation procedure and criteria for the internship.

The internship guidance and methodological advice are intended for learners majoring in Applied Mathematics and Computer Science.

ITMO University is the leading university of Russia in the field of information and photon technologies, one of the few Russian universities that has the status of a national research university. Since 2013 ITMO University has been a participant of the program for competitiveness increase of Russian universities among the world's leading research and education centers, known as "5 in 100" project. The goal of ITMO University is the development of a world-class research university, entrepreneurial in type, focused on the internationalization of all fields of activities.

«Knowledge is a treasure

but practice is the key to it»

Thomas Fuller

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INTRODUCTION

Internship guidance and methodological advice for learners mastering educational programs in the field of Applied Mathematics and Computer Science are designed in accordance with the following official documents:

- The Order of the Ministry of Education and Science of Russia No.1383 of November 27, 2015 "Regulations on the Internship of Learners Who Master the Basic Professional Educational Programs of Higher Education" [1];

- The Order of the Ministry of Education and Science of Russia No.301 of April 5, 2017 "On approval of the procedure for the organization and implementation of higher education programs – bachelor's degree programs, specialist's programs, master's degree programs" [2];

- The Federal law No. 273-FZ of December 29, 2012 (edit. December 25, 2018) "On education in the Russian Federation" [3]

- The Federal law No. 273-FZ of December 29, 2012 "On education in the Russian Federation" in edit. Federal laws No.99-FZ of May 07, 2013, No. 120-FZ of June 07, 2013 г., No.170-FZ of February 7, 2013 г., No.203-FZ of July 23, 2013, No.317-FZ of November 25, 2013, № 11-FZ of February 3, 2014, No. 15-FZ of February 3, 2014, No.84-FZ of May 05, 2014 [4].

- requirements of the Federal State Educational Standards of Higher Education of qualification profile Applied Mathematics and Computer Science [5];

- requirements of ITMO University Educational Standard of master's degree qualification profile of Applied Mathematics and Computer Science [6];

- ITMO University statute [7];

- Regulations of ITMO University on the internship of learners who master basic professional educational programs of higher education of April 16, 2018 [8];

- other local regulations of ITMO University.

The internship guidance and methodological advice allow the faculty to ensure the unity of the requirements for the content, the quality of the internship and the paperwork for students mastering professional educational programs at ITMO University within the qualification profile of Applied Mathematics and Computer Science.

1. GENERAL GUIDANCE

1.1 The Designation of Internship

Nowadays internship is an important educational component of any educational program due to increased need for highly qualified specialists.

The faculty of Information Technologies and Programming is a leading faculty, training students in the field of computer science. In year 2016, ITMO University was ranked 56th in the Times Higher Education World University Rankings by the Computer Science subject.

Our key priority is increasing employability and employment readiness, so the internship is a mandatory requirement for each student majoring in Applied Mathematics and Computer Science. The internship compliments the academic training. In the course of the internship learning outcomes are acquired.

The internship is an excellent way to try out a certain career. It provides learners with the opportunity to sharpen their skills, improve competences, gain confidence, build a network of contacts and, in the end, gain valuable experience needed to facilitate successful transition into the job market in their professional field after the graduation from university.

1.2. A Working Definition of "Internship"

The internship is a part of a curriculum of master's degree programs in the field of Applied Mathematics and Computer Science.

According to [9] internship is a period of time spent receiving or completing training at a job as a part of becoming qualified to do it.

The other definitions of internship is "the position of a student or trainee who works in an organization, sometimes without pay, in order to gain work experience or satisfy requirements for a qualification [10]" or "an internship is a temporary position with an emphasis on on-the-job training rather than merely employment, and it can be paid or unpaid [11]".

So, we define the internship as a work-based learning experience for university learners with or without payment.

1.3. Internship Types

Within the qualification profile of Applied Mathematics and Computer Science different types of the internship are implemented. We distinguish the following types: research & development activities, industrial internship and undergraduate practice.

Research & development (R&D) activities (or independent academic

research) are devoted to scientific work and designed to involve learners into different fields of Computer Science (scientific computing, artificial intelligence, bioinformatics and many others).

Industrial internship, known as a practical training or working practice, can be of different types – the project internship, the technological internship, the tech-project internship but, on the whole, such an internship represents in-company training for a specific job.

Undergraduate or pregraduation practice is designed and devoted to performing some work, summarizing results and writing a final thesis. This type of the internship requires the usage of theoretical knowledge and the expertise acquired during studies and previous internships.

Particular types of the internship are allocated by the head of the educational programs in appliance with the objectives and the content of the programs in the field of Applied Mathematics and Computer Science.

1.4. Educational Objectives

The internship is one of the stages of preparing to the occupation of a software engineer and designed to train learners for independent (self) work. The internship contributes to a smooth transition into a professional life, it helps to avoid difficulties with the integration process.

The master's program internship prepares students for scientific work and methodology, imparting theoretical and analytical abilities. The internship enables learners to get valuable hand-on experience, to react creatively to new unpredictable circumstances, to solve difficult, complex problems in the field of information technologies and programming, to responsibly perform duties within diverse projects. The work experience contributes to the understanding of professional subjects (courses) of the curriculum, the formation of insights into technological processes and the understanding of what a career in the field of computer science entails, etc.

According to the Order of the Ministry of Education and Science of Russia No. 1383 of November 27, 2015, the aim of the internship is the formation of professional skills & abilities and the acquisition of professional experience.

To achieve the mentioned objectives, the internship is aimed at reaching the following goals:

• the development of practical skills, the formation of professional competencies (research, design, implementation, technological, organizational and managerial) and the acquisition of professional experience;

• the development of skills in planning, managing their time and allocating resources;

• the development of interest and the increase of motivation in professional fields;

• the formation of ideas about the types of professional activities and the acquisition of experience in various areas of professional field related to IT-technologies;

• knowledge of interrelation between functional structure, corresponding personnel and underlying internal processes in their technical and economic context;

• the understanding of the product life cycle of the professional field, the principles of marketing and quality management;

• the formation of a professional worldview and ethics of the future specialist in information technologies and programming.

1.5. Intended Learning Outcomes

The master's degree program in the field of Applied Mathematics and Computer Science is aimed at generating algorithmic & mathematical competences, analysis, design & implementation competences, project management competence, technological and methodological competences.

In particular, the curriculum supports the acquisition of the following learning outcomes or competences:

• profound knowledge and understanding of the principles of informatics – general computer science expertise applicable in the long run, rooted in mathematically founded theory;

• comprehensive and detailed knowledge in the professional field of computer science, including its current state of development;

• critical awareness of the latest findings & achievements in computer sciences (technological and methodological) and ability to assess their implications as well as consequences;

• ability to formulate, structure and formalize problems stemming from a new and developing field within their qualification profile, develop and evaluate possible approaches, select and implement solutions;

• ability to describe and analyze problems using formal methods;

• ability to apply their judgement to tasks with complex, contradictory & incomplete information and solve incompletely defined problems which are unusual or with different possible specifications;

• ability to combine knowledge from different fields and deal with complexity;

• comprehensive understanding of applicable techniques and methods and their limits;

- ability to develop, analyze and implement algorithms and data structures in the development of systems and software;

- profound technical knowledge and ability to use it for design and implementation of information models, systems and processes;

- ability to generate ideas, conceptions, methods, procedures, techniques and technologies and assess them from different points of view;

- ability to apply mathematical methods, system and software for solving problems of scientific and technological areas;

- ability to apply innovative methods and technologies for solving problems in professional fields;

- a critical awareness of circumstances arising from the technical effects of their practical work as computer scientists and opportunities arising from the non-technical effects;

- awareness of basic principles, methods and forms of research work organization;

- willingness to lead a team (as well as international groups or research teams) in their professional field, tolerantly perceiving social, ethnic, religious and cultural differences;

- ability to responsibly organize work, monitor the solution process and present the plans and results of the work coherently;

- ability to define topics and objectives in professional fields (including academic environments, inter- and multidisciplinary fields), derive assignments from them and analyze risks;

- ability and willingness to make contributions to further development of computer science as a scientific discipline.

1.6. Workload and Duration

Labor intensity or workload of the internship implemented within the given master's degree program is 54 credits. It means the duration of the internship is 1944 hours. The biggest portion of it is devoted to research and development activities. Generally, the internship is well-integrated into the curriculum and scheduled in each semester to ensure that learners have sufficient time to achieve the intended learning outcomes mentioned in section 1.5.

1.7. Timescale

Timescale is an internship period or interval. Within the master's degree program in the field of Applied Mathematics and Computer Science learners have a portion of the internship each semester (module). The timescale of it is defined by the education process schedule-plan which is scheduled by the head of the master's degree program.

The internship period is issued before the beginning of academic year and can be found on the site of ITMO University.

1.8. Internship Placement

To do the internship, the learners majoring in Applied Mathematics and Computer Science are allocated to different organizations. These organizations can be structural units/departments of ITMO University (for example, the International Scientific Center "Computer Technologies") or partner-organizations[1] with which ITMO University has an agreement on the internship organization (the Order of the Ministry of Education and Science of Russia No. 1383 of November 27, 2015).

The place of the internship is assigned and issued by the order of ITMO rector.

The faculty gives learners the right to find the place of the internship independently in accordance with their interests, preferences, the level of knowledge and mastery of various technologies. At the request of the learner a place for internship can be provided by the management of the faculty. If the learner cannot choose the place for the internship, the faculty has the right to appoint the place and the supervisor of the internship at their discretion without learners' consent.

Learners combining studies with the labor activity have the right to do the internship at the place of their employment if their professional activity corresponds to the qualification profile of the master's degree program in the field of computer science and faculty's requirements for the internship.

1.9. Supervision of Internship

To ensure the specification accomplishment and high performance, the internship is a supervised process. In this respect each learner is assigned a supervisor (mentor) who belongs to university teaching staff (the Order of the Ministry of Education and Science of Russia No. 1383 of 11.27.2015).

The supervisor is assigned by the order of rector and the order is published on the site of the university.

If the learner has an internship in a partner-organization, he or she is assigned two supervisors: the supervisor from the University staff and the supervisor from a relevant company.

If the internship task lies in the interdisciplinary field, in addition to the supervisor(s) the learner may be assigned one or two consultants – expert-practitioners with relevant fields of expertise either from companies or universities.

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[1] Partner-organization – is an organization (or enterprise) specializing in IT-field and having an agreement with ITMO University.

All the arrangements about the internship (placement, supervision, etc.) should be made before the beginning of the internship.

2. INTERNSHIP ORGANIZATION AND PROCEDURE

2.1. General Procedure of Internship

Learners during the whole period of the internship are obliged:
- to carry out the assignments (tasks) prescribed by the syllabus;
- to comply with the internal regulations of the organization;
- to comply with the requirements of labor protection and fire safety (the Order of the Ministry of Education and Science of Russia No. 1383 of November 27, 2015).

The internship includes several consecutive stages, which are reflected in the timeline of the specification (individual task). The timeline is made up by the supervisor. If necessary, the timeline is corrected by the learner.

If the internship is done in the enterprise, the specification timeline is made up by both supervisors – from the company and the University (The order of the Ministry of Education and Science of Russia No. 1383 of November 27, 2015).

Usually the timeline comprises several stages which facilitate the execution of the chosen course of action effectively.
- Organizational stage: this stage includes introductory training, that is familiarising with the requirements of labor protection & accident prevention, fire safety rules, internal regulations & correct protocols of the organization, the process of scheduling or correcting the timeline, the approval of an individual task, the study of issues in the chosen area, the selection of references, etc.
- Specification implementation: the tasks are performed according to the drawn up and approved timeline and this stage includes at least three parts.
- Preparation of reporting documentation: this stage always includes the paperwork and the support of internship results.

The approximate timeline of the internship specification is presented in Table No. 1.

The intern or trainee is obliged to comply with the organization's internal work regulations, strictly follow the rules of labor and safety protection, perform the tasks accurately and submit it in due course, be responsible for the work and its results as the staff of the organization do.

Table No. 1 – Specification timeline

№	Stage name	Dead line	Stage's contents	Reporting forms
1	Organizational stage	Max2 days	- induction training: acquaintanceship with the requirements of labor protection & accident prevention, - safety, fire safeness, internal regulations of organization, - the process of planning or correction of the timeline, - the process of selection / formulation / correction of the task title; - approval of an individual task, study of issues in a selected area, - selection of literature, etc.	Specification
2	Implementation of the 1st part of specification		- literature analysis / research; - the studyof issues in the selected subject area;	- reporting documentation, - results of performed tasks[2]
3	Implementation of the 2d part of specification		- description of what you have to do during the second stage;	- reporting documentation, results of performed tasks
4	Implementation of the 3d part of specification		- description of what you have to do during the third stage;	- reporting documentation, -results of performed tasks
6	Preparation of reporting documentation	Max2 days	- preparation of reporting documentation and the process of supporting the results of the work.	- report (using established form), - a letter of reference, -individual task, - supervisor's review

2.2. Organizational Stage

The internship (practical training) in the enterprise should be preceded by the introductory training. It is a compulsory requirement, as the attitude of learners to the internship and working discipline depends on the quality of the introductory training. There are two types of introductory trainings. One of them can be called as an introductory briefing and it is conducted at ITMO University. The other one is an induction training and it is conducted in the enterprise. The learner who does an internship at a company must take both introductory trainings.

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[2] Reporting documents may be presentations, code, dataset, etc.

The introductory training is usually held on the first day of the internship. The primary objectives of the introductory training are:

- to inform learners about the especial features of the internship in the enterprise;
- to notify learners about the working hours and the internal regulations of the organization, to announce correct protocols for taking breaks;
- to instruct learners about the need to keep working discipline, and professional ethics during the internship;
- to inform learners about the rules of labor protection & accident prevention (life safety) in the organization;
- to enlighten learners about the objectives, goals, and the terms of the internship;
- to provide learners with the task (specification);
- to specify the scope and the framework, to correct the formulation of the internship task;
- to schedule the internship stages;
- to select literature;
- to apprise learners about the requirements for paperwork and the content of reporting materials upon completion of the internship;
- to inform learners about the evaluation criteria;
- to remind learners about the need of being punctual & time-keeping;
- to solve other organizational issues.

Learners who have not been instructed in labor protection and safety rules are not allowed to start the internship.

As a part of the organizational stage, there can be excursions in the enterprises providing internship placements. The excursions allow learners to get acquainted with the activities of the enterprise, the interrelation of its structural departments while solving professional problems.

During the excursions the following issues are covered:

- the history of the enterprise, its achievements and the milestones of development, the volume of output;
- the way the enterprise works on a long-term basis & on a day-to-day basis;
- the way the enterprise introduces new technologies, new technological processes and tools;
- software engineering methodologies and programming techniques that the company uses;

- automated control systems, modern computing equipment and software used in the enterprise;
- methods of work organization and quality management system of the enterprise;
- the current state and prospects of the industry's development.

2.3. Specification Implementation

After the introductory training, learners proceed directly to work. The individual task (specification) is devised by the internship's supervisor from the university. In case the internship is done at an enterprise, the specification is devised and agreed with both supervisors – from ITMO and the organization.

The trainee does the tasks at the workplace under the guidance of highly qualified specialists or experts on relevant fields (so called seasoned professionals) who belong to the staff of the organization. It will help to obtain better results and make the internship more effective.

The intern should read the internship syllabus, study the task (e.g. goals), if necessary, the intern may get work recommendations and advice on report paperwork.

At the first stage the intern discusses with the supervisor the goals and the ways of achieving them, the stages and the deadlines, then he or she selects literature sources and technologies necessary for the project.

After that the intern studies the issues in chosen subject area, analyzes literary sources and performs the tasks according to the goals and the timeline.

In order to increase the internship effectiveness, it is recommended to keep records of the difficulties that arose, the reason they appeared, how these problems were overcome, and the results of the fully completed stages. Such an analysis will help the learner to draw conclusions about the future career path, what knowledge and skills he or she lacks and what competencies they need/want to acquire or develop.

If necessary, learners can get guidance and methodological advice from the internship's supervisors, consultants and other staff of the university responsible for the internship.

2.4. Preparation of Reporting Documentation

Any internship ends with the paperwork. The set of reporting documents is established by the management of the educational program and may include the following papers:

- the specification;
- the review of the supervisor;

- the diary of the internship (optional);
- the report.

The collecting of materials for the report goes on and on throughout the entire period of the internship; the paperwork is done at the final stage.

Upon completion of the internship, the trainee prepares and submits reporting materials for the approval to the supervisor. If the intern is assigned two supervisors, firstly the supervisor from the enterprise checks up reporting documents, then the supervisor from the university.

The reporting documentation should be done taking into consideration the requirements of this manual.

The internship report should include textual, graphical and other illustrative materials. When writing a report, the intern uses scientific and technical literature, periodic sources and materials, systematizes, summarizes and critically evaluates information.

The set of reporting materials is sorted out and submitted in the following order:

1) the specification;
2) the diary (if used);
3) the review of the supervisor;
4) the report.

3. REQUIREMENTS FOR REPORTING DOCUMENTATION CONTENTS AND PAPERWORK

3.1. General Requirements for Reporting Documentation

Internship's reporting documentation should meet the following requirements:

- logical consistency;
- clarity of work results' presentation;
- conciseness and accuracy of formulation excluding the possibility of ambiguous interpretation;
- persuasive argument;
- informational expressiveness;
- authenticity & reliability;
- sufficiency and validity of the conclusions.

It is forbidden to fill out the forms of reporting documents by hand. Reporting documentation is prepared with a help of computer text and graphic editors.

A mandatory requirement is the alignment of text to the width of the page.

Documents with two or more pages should be numbered in Arabic numerals in the center of the header, using Times New Roman. The font size is at least 13 points.

When doing paperwork, it is necessary to avoid transferring the "signature" requisite to the next page without two or three lines of the preceding text.

3.2. Requirements for Specification

Specification is an internship's individual task assigned to the learner by the organization (university or enterprise) according to which the learner performs the tasks (stages) of the internship. The template of the specification is presented in appendix 1.

The following information is usually indicated on the first page of the specification:

- the type of the internship;
- the surname, the name and the patronymic of the learner;
- the number of the group;

- the faculty;
- the field of education;
- the supervisor of the internship from the university (name, position and academic degree);
- the title of the task;
- the timescale of the internship;
- the place of the internship;
- the trainee's position.

The specification of the industrial or pregraduation internship includes the following mandatory sections.

Section "Types of work and requirements for them". The section lists the work that must be performed to achieve the goals and the requirements for work. Formulating the requirements for work one should focus on the results, which are to be achieved by the end of the internship.

Section "Types of reporting materials and requirements for them". This section lists the types of reporting materials, specifies the form of their presentation and the requirements for the work scope. The list of reporting materials includes the specification with a timeline (schedule-plan), the review of the internship supervisor, the internship report, presentations, etc.

Section "Timeline (or schedule-plan)". It contains the list of the internship stages, their deadlines, the types of work and the forms of reporting documentation.

The internship's specification is approved at the faculty's meeting, signed by the university supervisor of the internship and the trainee. This document is handed out to the trainee at the beginning of the internship.

3.3. Requirements for Internship Diary

Generally, the internship diary is optional, but at the supervisor's discretion or insistence some learners may be recommended to keep a diary. In case the diary is kept, it is advised to fill it in every day. The template of the supervisor's review is presented in the appendix 2.

The title of the diary contains the following information:
- the surname and initials of the learner;
- the faculty's name;
- the group;
- the field of education;

- the place of the internship;
- the supervisor of the internship from the organization (full name, position);
- the supervisor of the internship from ITMO University (full name, position and academic degree);
- the surname and initials of the person responsible for the internship from ITMO University.

The diary itself includes the following details: the date, the brief summary of the performed work, issues/questions, achieved results and the implementation mark, which is given by the internship supervisor from the organization. It is highly advised to learners to keep assessing the performance and records of it during the internship.

3.4. Requirements for Supervisor's Review

Supervisor's review is a formal critical evaluation of the results achieved by the learner during the internship.

The template of the supervisor's review is presented in appendix 3. The first page of review contains the following information:
- the type of internship;
- the surname, the name and the patronymic of the learner;
- the education field;
- the place of the internship;
- intern's position;
- the specification's title.

For making up a review supervisor uses a template (appendix 3).

The internship supervisor evaluates the work done by the trainee taking into consideration the level of learner's knowledge, skills, abilities and competencies and uses the criteria presented in Table 2 "Progress evaluation". The internship supervisor points out the advantages and disadvantages of the trainee, gives a conclusion on the results achieved and a mark.

Depending on the place of the internship, the review is signed by different supervisors. If the internship is done at the university, the supervisor from ITMO University signs the review. If the learner does the internship in a partner-organization, the supervisor from the enterprise signs it.

The signature of the enterprise's supervisor is authenticated by the stamp of the organization.

Doing paperwork, it is recommended to use double-sided printing for the review.

Table 2 – Progress evaluation

№	Indicators *	Mark			
		5	4	3	0 **
1.	Knowledge of software engineering methods, including design and technical documentation	+			
2.	Knowledge of project management and phases of software development project management methods	+			
3.	Ability to develop software, educational and methodical complexes (systems), implement forms of project and collective training	+			
4.	Ability to use methods of collecting product requirements, planning production processes and resources	+			
5.	Ability to manage personnel, incidents, infrastructure provision				
FINAL GRADE		excellent / good / satisfactorily/ unsatisfactory			

3.5. Requirements for Report

Internship report is a document containing information organized in a narrative, graphic, or tabular form, prepared at the end of the internship.

The template of the report is presented in appendix 4. Usually the structural elements of the report are:

- title page;
- goals and objectives of the internship;
- information about the organization (description of the enterprise);
- position held by the intern;
- technologies used;
- project goals and planned results;
- description of the completed work;
- findings;
- conclusion;
- the list of abbreviations and conventions;
- glossary;
- references.

The list of abbreviations and conventions, the glossary and appendices are not mandatory sections of the report.

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* intended learning outcomes from internship's syllabus
** not assessed (difficult to assess)

The recommended length of the internship report is at least five pages of printed text and appendices do not count. The internship report should be formatted in accordance with State Standard GOST 7.32-2017 [12].

The title page is the first page of the report. The title page should include the following data:

- the surname, name and patronymic of the learner;
- the type of the internship;
- the title of the task;
- the internship supervisor from the organization (full name, position and academic degree);
- the internship supervisor from the university (full name, position and academic degree);
- a person who is in charge of the internship from the university (full name, position and academic degree);
- the city and year of the report.

The report is written with a help of computer text and graphic editors. It should be printed on one side of A4 paper (210x297 mm).

The font is Times New Roman of 14 size. Line spacing is 1.5.

Margins are 30 mm on the left, 10 mm on the right, 20 mm above and below.

Paragraph indentation should be the same throughout the whole document − 1.25 cm.

A mandatory requirement is the alignment of the text to the width of the page.

When writing a report, one should strictly adhere to the rules of spelling and punctuation. In the text of the document it is not allowed:

- to use conversational (colloquial) speech;
- to use different scientific and technical terms for the same concepts;
- to use abbreviations of words, except those established by relevant standards;
- to abbreviate the notations of physical quantities if they are used without numbers (except for physical quantities in tables and transcripts included in formulas and figures).

Page numbering. Report pages are numbered in Arabic numerals. The numbering begins with the title page, but the page number is not printed. Page

numbers are printed starting from the second page. Page numbering should be throughout the whole text.

Sections. If necessary, the main part of the report can be divided into sections and subsections, paragraphs and sub-paragraphs, which are numbered in Arabic numerals and begin with a paragraph indent. Sections should have an ordinal numbering within one text except for appendices.

Headings. The headings of the sections and the subsections should be printed in a bold type, without underlining. Word hyphenation is not allowed. Large headers are placed in several lines with one interval between them. The headings are separated from the text by additional spaces – three spaces before the text and two spaces after the heading. You cannot leave the heading at the end of the page, if two or three lines of the following text fit that page.

Illustrations. Illustration in the official document is called a figure. All the figures (illustrations) should be referenced in the text of the document. Figures are placed directly below the text in which they are first referred to or on the next page. Figures and their captions are formatted according to GOST 2.105 [13].

The caption to the figure should be placed under the picture, center-aligned and without the indentation. The figures should have Arabic numerals. The numbering of the figures should be ordinal throughout the whole document.

Tables. The tables contain generalized information of theoretical research, statistical data and their analytical processing, initial information for analysis, results of calculations, etc. All the tables should be referenced in the text. The tables are placed under the text in which the link to them was first given, or on the next page. In the tables it is allowed to use a smaller font size than in the text.

The tables are numbered in Arabic numerals and should have an ordinal numbering throughout the whole report.

The name of the table is placed above the table and should be left aligned without the paragraph indentation. When the table occupies two pages, the second page starts with the inscription "Continuation of the table ..." which is right justified.

Formulas. Mathematical formulas should be placed in a separate line. The formulas, as well as figures and tables, should have a continuous sequential numbering in Arabic numerals. The ordinal number of the formula is placed in

the parentheses to the right of the formula and is aligned to the right edge of the page. The numbering of the formulas within the section is allowed.

It is necessary to give references to the formulas in the text. After the formula is used, each new symbol should be explained. Each new symbol occupies a separate line and appears in the sequence in which symbols are given in the formula. The first line of the explanation should begin with the word "where."

Summary. The report concludes with a summary of the work where the learner presents summarized results, evaluates the extent to which the tasks are solved & the goals are achieved, the prospects for the further development of the task.

Abbreviations and conventions. If necessary, the learner adds the list of abbreviations and conventions to the report. The abbreviations of words and phrases are edited in accordance with the requirements of GOST 7.11 [14] and GOST 7.12 [15]. The presence of the list does not exclude the decoding of abbreviations and symbols when they first appear in the text. The list should be arranged alphabetically. The abbreviation or the symbol is placed on the left, the decoding – on the right.

Glossary. Glossary (or the list of terms) is placed after the list of abbreviations and conventions. The glossary is included in the report when specific terminology is used. Each term is given an appropriate explanation in the glossary. The glossary is edited & formatted in conformity with the requirements of GOST R 1.5–2001 [16]. The term is written with a lowercase letter, and the definition – with a capital letter. The term is separated from the definition by the colon.

References. References to literature should be indicated in square brackets. References are numbered as they first appear in the text, and in this order the list of references is formed.

References include bibliographic descriptions of sources used in the work. References should be placed after the glossary and in the order of the first mention in the text. The list of references should be formatted in appliance with GOST 7.1–2003 – Interstate Standard "Bibliographic Record. Bibliographic description. General requirements and rules" [17].

Appendices. Appendices contain material of an auxiliary nature, which would make the reading of the main part more difficult. The appendices may include computer printouts, input data, calculation methodology, historical

references, graphic material (complex drawings and diagrams), reference works. All the appendices must be referenced in the text of the report. Appendices are placed in the order of reference to them in the text.

Appendices must be numbered in Arabic numerals or English letters. The inscription "Appendix" is made in the upper right corner of the page. The subject heading of the appendix reflecting its content is written below in lower case letters in the center of a line.

Appendices are placed at the end of the report after the list of references. Each appendix should start from a new page. Appendices should have a common page numbering with the rest of the work.

4. CRITERIA FOR INTERNSHIP EVALUATION – ROUTINE CONTROL AND ATTESTATION AT THE END OF THE SEMESTER

The results of the internship are evaluated and marked according to the regulations of ITMO University (the Order of the Ministry of Education and Science of Russia No. 1383 of November 27, 2015).

All the evaluation criteria are published in this guidance, which makes the evaluation process transparent and clear to the learners.

The monitoring of the performance & progress is carried out in the form of routine (current) control and intermediate attestation.

The routine control is carried out with a help of the following assessment tools:

- interview & weekly discussions;
- internship specification (or individual task) with a schedule-plan (timeline) in conformity with the approved curriculum and syllabus.

Intermediate attestation is carried out in the form of a pass with a mark (so-called a differentiated pass). Intermediate attestation is intended for evaluating competences acquired during the internship with a help of the following tools of assessment:

- the supervisors' review;
- the internship's report.

Reporting documentation should be handed in within the scheduled time. Usually it is the end of the internship.

4.1. Evaluation Criteria for the Interview

Interview is considered the individual form of control. It implies the conversation of the supervisor and the learner about the work. The interview helps to detect the level of the learner's willingness and motivation to work. Assessment tools for the interview are discussion questions (topics) and evaluation criteria.

The interview includes an introductory training (briefing and induction training). Also, in the course of the interview the supervisor and the learner discuss the specification, draw up/correct the schedule-plan (timeline), decide on the deadlines, etc.

Approximate discussion topics for interview can be as follows:

- the aims and tasks of the project (applied research);
- the methods of data collecting and data analysis;

- the usage of computer programs and information systems in professional activities;

- the research and development of models and algorithms in conformity with the qualification profile of professional activity;

- the research and development of the tools for ongoing projects;

- the principles for the preparation of scientific, technical and analytical reports and presentations;

- work with periodical, abstract and reference publications for making up reports on research results;

- research work in a team in appliance with the qualification profile of the professional activity.

The grading scale and evaluation criteria for the interview are shown in Table № 3.

Table № 3 – The grading scale and evaluation criteria for the interview

№ п/п	Grading scale	Evaluation criteria
1.	Passed	The learner had the introductory briefing and answered the questions related to the internship.
2.	Failed	The learner did not have the introductory briefing, had significant difficulties when answering the questions related to the internship.

4.2. Evaluation Criteria for the Internship Diary

The requirements for paperwork: the main requirements for the internship diary are accuracy, timeliness and literacy (the requirements and evaluation criteria are presented below in Table No. 4).

The deadlines and the form of submission: the internship diary is filled in every working day during the whole period of the internship and is handed in to the supervisor after the internship's completion.

Table № 4 – The main requirements for the diary

№ п/п	Grading scale	Evaluation criteria
1.	Pass with an excellent mark	- the diary is kept accurately, timely and competently; - the types of work are presented in accordance with the requirements for the internship syllabus, are descriptive and logically justified.
2.	Pass with a good mark	- the diary is kept accurately, timely, competently; - the types of work are not fully presented; the language of a diary is not professional.
3.	Pass with a satisfactory mark	- generally, the task is executed, but there are performance shortcomings of some parts of the task; - there are remarks on the paperwork of the collected material.
4.	Fail (unsatisfactorily mark)	In all other cases

4.3. Evaluation Criteria for the Internship Specification

The requirements for paperwork: the individual specification must be written accurately and correctly (the requirements are presented below in Table 5).

The deadlines and the form of the presentation: the learner gets the task on the first day of the internship or just before the beginning of the internship, during which the task must be performed completely.

Table № 5 – The main requirements for the individual specification

№ п/п	Grading scale	Evaluation criteria
1.	Pass with an excellent mark	The specification was implemented flawlessly and completely, the learner showed a high level of independence and creative approach during its implementation.
2.	Pass with a good mark	Individual specification was done completely, but there are some shortcomings in paperwork of the presented results.
3.	Pass with a satisfactory mark	Generally, the specification was completed, however there are performance shortcomings of separate parts of the specification, there are remarks on paperwork of the collected material.
4.	Fail (unsatisfactorily mark)	The specification is completed only partially, there are numerous remarks on the paperwork of the collected material.

4.4. Evaluation Criteria for the Internship Report

At the end of the internship, the learner finalizes the internship report and submits it to the supervisor.

The internship report covers the following issues:

- the current state of the scientific and technical problems of the chosen field;
- main types of internship work and findings;
- conclusions describing the results and recommendations.

The following things should be taken into consideration, while evaluating the internship:

- the quality of specification performed and the paperwork of reporting materials;
- the initiative of the learner and the review of the supervisor(s);
- the timeliness of the report submission, the level of responsibility and independence, etc.

The internship report must include text, graphics and other illustrative material. While writing the internship report, the learner must use scientific and technical literature, periodic sources and materials, systematizing, summarizing and critically evaluating information.

Table № 6 – Grading scale and evaluation criteria

Grading scale	Evaluation criteria
Pass with an excellent mark	– report is submitted in due time; – all necessary sections are present; – the necessary materials (graphics, etc.) are present; – work is performed correctly /results are correctly processed; – conclusions are true and logical; – report paperwork meets the requirements (font, etc.); – the learner answers all the questions of the supervisor about the work results independently.
Pass with a good mark	– report is submitted in due time; – all necessary sections are present; – the necessary materials (graphics, etc.) are present; – work is performed correctly/results are correctly processed; – there are no errors or one or two small inaccuracies in the conclusions; – report paperwork meets the requirements (font, etc.); – the learner answers all the questions about work results

	independently or with the help of additional leading questions.
Pass with a satisfactory mark	– report submitted in due time or with a little delay; – all necessary sections are present; – presented material (graphic, etc.) contains inaccuracies and/or is not of a good quality; – work is performed correctly / results are correctly processed; – there are one or two inaccuracies/errors in the conclusions; – the paperwork of the report meets the requirements (font, etc.); – the learner answers the questions of the supervisor about work results with the help of additional leading questions and/or hints.
Fail (unsatisfactorily mark)	– not all required sections are present; – there is no complete set of necessary material (graphic, etc.).); – work is done incorrectly/ results are processed in the wrong way, etc.; – conclusions are missing or done wrong; – careless performance; – paperwork of the report does not meet the requirements (font, etc.); – the learner has significant difficulties answering questions about the work results.

4.5. Criteria for Attestation at the End of the Semester

1. The pass with an excellent mark — the internship requirements are totally satisfied, the specification is done completely and flawlessly, the content and the formatting of reporting documentation fully comply with the requirements:

- *the learner is able to demonstrate the practical skills and work abilities acquired during the internship in accordance with the individual internship specification;*
- *the learner is able to set forth the key concepts about the phenomena and the processes faced during the internship;*
- *the learner is able to present the theoretical basis and explain the selection of specific methods used during the internship;*
- *the learner is able to support (defend) the results of his/her work described in the reporting documents.*

2. The pass with a good mark — the internship requirements are almost (nearly) satisfied, there are insignificant remarks on the implementation of the specification, the content and the formatting of the reporting documents fully meet the requirements:

- *the learner is able to demonstrate the most of practical skills and work abilities acquired during the internship in accordance with the individual internship specification;*
- *the learner is able to state the key concepts about the phenomena and processes encountered during the internship with insignificant mistakes (remarks);*
- *the learner is able to set forth the theoretical basis and explain the selection of specific methods used during the internship;*
- *the learner is able to support (defend) the results of his/her work presented in the reporting documents with minor remarks.*

3. The pass with a satisfactory mark — the internship requirements are more or less satisfied, there are significant remarks on the implementation of the specification, the content and the formatting of the reporting documents comply with the requirements partially:

- *the learner is unable to demonstrate the practical skills and work abilities, acquired during the internship without difficulties;*
- *the learner is able to set forth the key concepts about the phenomena and processes faced during the internship with significant mistakes;*
- *the learner is able to present the theoretical basis and explain the selection of specific methods used during the internship, but makes significant mistakes;*
- *the learner supports (defends) the results of the work presented in the reporting documents with significant remarks.*

4. Fail or unsatisfactorily mark — the internship requirements are not satisfied, there are blunders, miscalculations and other significant remarks on the implementation of the specification, the content and the formatting of the reporting documents do not comply with the requirements:

- *the learner is unable to demonstrate the most of practical skills and work abilities he/she had to acquire during the internship;*
- *the learner is unable to state the key concepts about the phenomena and processes encountered during the internship, and makes significant mistakes;*
- *the learner is unable to present the theoretical basis and explain the selection of specific methods used during the internship and makes significant mistakes;*
- *the learner cannot support (defend) the results of the work presented in the reporting documents without significant mistakes.*

GLOSSARY

assessment tool:	Tools for judgement and evaluation of performance and skill levels or tools designed to measure the level of knowledge, skills and abilities.
curriculum:	Curriculum refers to the entire period of study and includes all the subjects.
differentiated pass:	A pass with a mark.
educational program (or study program):	A program for training specialist, that defines curriculum and syllabi and is provided by a university.
educational process schedule-plan:	It is an annual calendar plan which supplements the curriculum and shows the duration of subjects, internships, sessions and holidays by weeks.
induction training (introductory briefing):	Is also called as an orientation program, when the trainee is introduced to the internal rules and regulations of an organization, fire safety rules, the requirements of labor protection & accident prevention, with the aim to make him/her accustomed to the working environment and in our case.
intended learning outcomes:	Achievements (knowledge, abilities and competences) that should be attained by students.
intern:	Someone who is finishing training for a skilled job especially by getting practical experience of the work involved.
internship timescale:	The period of time over which internship happens.
labor intensity:	Is the relative proportion of labor (compared to capital) used in a process.
master's degree program:	An education program of master level. When you complete such program, you are awarded the master degree.
placement:	The finding of suitable employment for applicants or assignment of students to appropriate internship work place.

qualification profile:	It describes the structure and the scope of the qualification for a particular filed of education or after completing a particular master's degree program.
reporting documents:	A set of documents provided on paper that gives full details of learners' activities, achieved results or findings, and consequently, it shows skills, abilities and competences acquired by the learner.
routine control:	The current monitoring of the progress
syllabus:	Syllabus refers to a particular subject. Usually Syllabus consist of topics or portion covered in a particular subject. Syllabus is for each subject that is covered throughout the period of studies.
trainee:	A person who is learning and practicing the skills of a particular job.

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APPENDICES

Appendix 1

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

**SAINT PETERSBURG NATIONAL RESEARCH UNIVERSITY
OF INFORMATION TECHNOLOGIES, MECHANICS AND OPTICS
(ITMO UNIVERSITY)**

Faculty of Information Technologies and Programming

SPECIFICATION
FOR…………………INTERNSHIP
(the internship type)

Student _____ **Group** _____
(**Surname, initials**)

Supervisor _____
(**Surname, initials, degree, work place, position**)

The task title: _____

_____

_____

_____

Timescale of internship: _____

The place of internship: _____

Position during the internship: _____

1. Activity types and the requirements: _____

_____

_____

_____

_____

_____

_____

_____

2. Types of reporting materials and paperwork requirements: _____

_____

_____

_____

_____

_____

_____

3. TIMELINE

№	Stage Title	Deadline	Activity types	Report type
1	2	3	4	5

The task is approved at a faculty meeting _____

(protocol dated «____»_____20____г.   №_____).

Date of assignment: «   »_____**20**_____

Supervisor _____
(Supervisor's signature)

Task accepted for execution _____
(Student's signature)

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

**SAINT PETERSBURG NATIONAL RESEARCH UNIVERSITY
OF INFORMATION TECHNOLOGIES, MECHANICS AND OPTICS
(ITMO UNIVERSITY)**

INTERNSHIP DIARY

period from_____ to_____

Student _____
(Surname, initials.)

Faculty   Information Technologies and Programming

Group _____

Field of education   Applied Mathematics and Computer Science

The supervisor from the organization _____

_____

Responsible for the internship from   _____
ITMO University _____

The task is completely performed

_____
Signature of responsible for the internship from ITMO

_____
(Date)

Saint Petersburg
20XX

Date	Summary of work	Questions	Achieved results	Implementation mark*

---

* Signature of the internship supervisor from the organization

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

**SAINT PETERSBURG NATIONAL RESEARCH UNIVERSITY
OF INFORMATION TECHNOLOGIES, MECHANICS AND OPTICS
(ITMO UNIVERSITY)**

REVIEW
OF THE SUPERVISOR
(the type of internship)

Student
_____
(Surname, initials)

Faculty   Information Technologies and Programming

Field of education   Applied Mathematics and Computer Science

The place of internship

Position during internship

The individual task Title

PROGRESS EVALUATION

№	Indicators*	Mark			
		5	**4**	**3**	**0****
		+			
		+			
		+			
		+			
5.					
FINAL GRADE					

---

* list intended learning outcomes from internship's syllabus

** not assessed (difficult to assess)

Marked advantages:

_____

_____

_____

Marked disadvantages:

_____

_____

_____

_____

Summary:

_____

_____

Internship supervisor _____ / Initials Surname
                                    (signature)

«_____»_____ 20_____

Appendix 4

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

SAINT PETERSBURG NATIONAL RESEARCH UNIVERSITY
OF INFORMATION TECHNOLOGIES, MECHANICS AND OPTICS
(ITMO UNIVERSITY)

Faculty   Information Technologies and Programming
Field of education Applied Mathematics and Computer Science

R E P O R T
on the internship
<small>(the internship type)</small>

The task title:_____

Student _____ **Group №**_____
  <small>(Surname, initials)</small>

Supervisor from an enterprise:_____
          <small>(Surname, initials, work place, position)</small>

Supervisor from the organization:_____
          <small>(Surname, initials, work place, position)</small>

Responsible for the internship from ITMO University:_____
          <small>(Surname, initials, position)</small>

Internship passed with the mark_____

            _____
        <small>(the supervisor signature)</small>

Date _____

Saint Petersburg
20XX

1. Goals and objectives of the internship.
2. Information about the organization.
3. Position during the internship.
4. Objectives of the project.
5. Technologies used during the project.
6. Description of the completed project.
7. Conclusions.
8. The list of abbreviations and conventions.
9. Glossary (if necessary).
10. References.

ITMO UNIVERSITY

University's Mission - to provide opportunities for the holistic development of individuals and to inspire them to tackle global challenges.

The University's strategic goal - is to generate new knowledge, markets and businesses, to navigate individuals in the world of information while preserving the balance between physical and virtual reality.

Information Technologies and Programming Faculty

The Information Technologies and Programming Faculty prepares professionals in the field of software engineering for databases and databanks, dialogue expert systems of an artificial intelligence, electronic banking systems, corporative systems of enterprise management and controlling sophisticated technical facilities including petroleum refineries, power stations, airports, banks, different institutions, computer games, educational systems, that use computerized training technologies.

A specific feature of the systems mentioned above consists in the requirement of the software development predominating in the whole system design (up to 90 %).

The Faculty provides education at Bachelor's and Master's levels specialized in Applied Mathematics and Informatics and Engineers in Information Systems and Technologies, Information Technologies in Education, Business Information Technology.

Our Faculty is one of the best Russian higher educational institutions specialising in training computer science specialists.

A special pride of our Faculty is the system for training students gifted in precise and computing sciences, which has turned into a worldwide-recognized center for training talented young programmers.

The St. Petersburg State University of Information Technologies, Mechanics and Optics (St. Petersburg ITMO) ranks among the three prize winning tertiary education institutions in Russia specializing in computer science and technology. During the last decade of the twentieth century, the rapid development in computing technology and computer know-how increased as well as a corresponding toughening of the qualifying standards for specialists. Simultaneously, the enthusiasm of applicants has led to higher standards in education for the specialties concerned with computer technologies. As a result, in 2000 one of the oldest computer Faculties in Russia - the Computer Technologies and Operation Faculty became the largest Faculty in our University. Later it was divided into two Faculties; one of them is the Faculty of the Information Technologies and

Programming. Our University became almost the only Russian tertiary institute with two specialized Computer Faculties.

Furthermore, the creation of the Information Technologies and Programming Faculty was caused by a more essential reason. Nowadays the main part of the manpower, material and financial resources in the computer industry is concerned directly not with the manufacture of the computer equipment (hardware) but to a greater extent with the program product (software). It is no accident that last year`s largest companies produced a non-material product - software, being the leaders and the largest corporations in the world.

The Faculty is recognized in Russia as the leader in the field of the computer networks and telecommunication systems, as well as software development. Faculty members were the initiators of the Russian Federal intercollegiate computer network RUNNet and have substantially contributed to its development. This network makes it possible for the Russian higher schools to gain access to the global network Internet. There are technical and administrative network centers operating RUNNet at the university. In 2000 Faculty members awarded the Russian Governmental Prize for their contributions to establishing RUNNET.

The Faculty conducts educational and organization work for training software developers. At the Faculty there is a Center organizing the North-East European semi-final competitions as part of the World Team Programming Championship. In 2002, with the efforts of the Faculty's teachers and students the first All-Russia Team Programming Contest was held.

Great attention has been paid to the students` scientific activity. During last four years, students of the Faculty have published four books in the central publishing houses (that is the best achievement among Russian tertiary institutions) and more than 150 articles in foreign scientific magazines. They have received 12 grants from the President of Russia, 5 grants of the Russian Government, more than 50 Soros` grants and about 30 grants from the international scientific funds.

The Faculty has established a wide network of international connections with foreign universities and with the largest computer corporations such as Microsoft, IBM, SUN, Siemens rendering assistance in the teaching process and sometimes offering to the graduates job in their research centers in Russia and abroad. A number of the leading St. Petersburg computer companies involved in the international system of software development and financing also participate in student training as far as they need highly proficient staff.

The efforts of the Faculty are focused not only on the preparation of gifted elite computer specialists. The Faculty has a training program for students from different regions of Russia which is self funded. This program is conducted in co-operation with the Natural Science Faculty. One of the main objectives of this program is to run an academic process for graduates of Intercollegiate Access Courses in order to help these students to

adapt step by step to the requirements of St. Petersburg tertiary institutions in conditions that are attentive and monitor student progress.

Oksana Pavlova
Georgiy Korneev
Alex Sergushichev
Andrew Filchenkov

Internship guidance and methodological advice for foreign students of ITMO University

Student handbook

Editorial and publishing department

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