INTERNATIONAL EUROPEAN UNIVERSITY
Education and Research Institute "European Business School"
Department of Information Technology

Approved by
The Scientific and Methodical Council of the University

Chair of SMC _____

WORKING PROGRAM OF THE ACADEMIC DISCIPLINE:

TECHNOLOGICAL PRACTICAL TRAINING

Knowledge area: 12 Information Technology

Specialty: 121 Software Engineering

Educational program: 121 Software Engineering

Discipline status: Compulsory

Kyiv – 2023

The working program of the Technological practical training academic discipline is based on the 121 Software Engineering educational and professional program for the first (Bachelor) level of the 121 Software Engineering specialty approved by the University Academic Council on July 1, 2021, protocol No. 7.

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Reviewers: Ivan Kazachkov, Doctor of Science (Techn.), professor
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Guarantor of the educational program: Oleksandr Nesterenko, Doctor of Science (Techn.), professor

The working program of the academic discipline is reviewed and approved by the Department of Information Technology, protocol dd. August 31, 2023, No. 1.

Head of the Department
Doctor Science (Techn.),
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The program is reviewed and approved by the Academic Council of the European Business School, protocol dd. September 11, 2023, No. 1.

Chair of the Academic Council
PhD in Economics, associate professor,
Acting Director
of the European Business School

Y.S. Remyha,

Registration No. _28/23__

INTRODUCTION

The **program of the Technological practical training academic discipline** is designed according to the Higher Education Standard of Ukraine (hereinafter referred to as the Standard) of the knowledge area: 12 Information Technology, specialty: 121 Software Engineering.

Discipline description (annotation). Technological practical training is a part of the educational process, which involves strengthening theoretical knowledge in the process of mastering practical skills in the chosen specialty, gaining experience in analyzing subject areas and their formalization in the creation of software, mastering software engineering skills.

Technological practical training provides an opportunity to develop not only practical skills but also creative abilities of students, their independence, ability to make decisions and work in a team. The internship lays the foundations of professional experience, practical skills and abilities, professional qualities of a future specialist in the field of software engineering.

Table 1

<table>
<tr><td rowspan="2">Criteria</td><td rowspan="2">Knowledge area, training program, educational level</td><td colspan="2">Discipline characteristics</td></tr>
<tr><td>full-time mode of study</td><td>part-time mode of study</td></tr>
<tr><td>Number of credits – 4</td><td>Knowledge area:
12 INFORMATION TECHNOLOGY</td><td colspan="2"><u>Compulsory</u></td></tr>
<tr><td>Sections – 1</td><td rowspan="8">Specialty:
121 SOFTWARE ENGINEERING</td><td colspan="2">Year of training</td></tr>
<tr><td>Content sections – 1</td><td>2023-24</td><td>2023-24</td></tr>
<tr><td rowspan="3">Individual research task:</td><td colspan="2">Semester</td></tr>
<tr><td>6th</td><td>6th</td></tr>
<tr><td colspan="2">Lectures</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Total amount of hours – 120</td><td colspan="2">Practical and laboratory classes</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="3">Weekly load:
class hours – 0
independent work of students – 30</td><td rowspan="3">Educational level:
Bachelor</td><td colspan="2">Independent work</td></tr>
<tr><td>120 hours</td><td>110 hours</td></tr>
<tr><td colspan="2">Type of control:</td></tr>
<tr><td>Graded test</td><td>Graded test</td></tr>
</table>

1. GOAL AND OBJECTIVES OF TECHNOLOGICAL PRACTICAL TRAINING

The goal of technological practical training:

- to strengthen, deepen and supplement the student's theoretical knowledge

obtained during the study of general education and special disciplines;

- to acquire skills of professional activity by studying the experience of the enterprise;
- to develop skills of independent work on conducting research of the enterprise activity, functioning of its structural units;
- to develop the ability to independently solve individual scientific and applied problems in the profile of the future specialty;
- to gain work experience in the positions of specialists who perform work on software development.

Key objectives of technological practical training:

- to learn to use theoretical knowledge of software engineering methods and techniques in practice;
- to master the skills of independent collection of facts and data and their scientific generalization and research in order to substantiate on their basis theoretical provisions and practical recommendations for solving certain problems of software development;
- to collect materials for writing and drawing up the technological practice report;
- to get practical information on social and professional issues of organization of software systems design processes;
- to familiarize with the purpose, functions, production and management structures of the enterprise;
- to study the organization of profile activity, to get acquainted with the methods of organization of technological processes, to master the techniques of technical and economic calculations;
- to evaluate the technical and technological base of the main activity of the enterprise, personnel composition;
- to learn the aspects of ensuring the competitiveness of the specialized activity of the enterprise;
- to deepen and consolidate theoretical knowledge of system design and program project management;
- to acquire understanding of program documentation, reports on testing, quality assurance of the software product, etc.);
- to develop recommendations for improving technological activities at the enterprise;
- to suggest your own technological plan of activity on creation of a program product.

Competencies and learning outcomes encouraged by the discipline (interrelation with the statutory content of student training stipulated in learning outcome terms of the Standard).

According to the Standard requirements, the discipline provides students with the following ***competencies:***

Integral competence	Ability to solve complicated specialized tasks and practical problems in software engineering characterized by complexity and uncertainty of conditions using theories and methods of information technology.

General competencies	GC 2. Ability to apply knowledge in practical situations. GC 6. Ability to find, process and analyze information from different sources. GC 7. Ability to work in a team. GC 10. Ability to act in a socially conscious manner. GC 11. Ability to exercise your rights and obligations as a member of society, realize values of civil (democratic) society and need for its steady growth, supremacy of law, rights and freedoms of individuals and citizens in Ukraine.
Specialized (professional, subject) competencies	SC 1. Ability to identify, classify and formulate software requirements. SC 2. Ability to take part in software design, including modeling (formal description) of its structure, behavior and operational processes. SC 3. Ability to develop architectures, modules and components of software systems. SC 4. Ability to formulate and ensure software quality requirements in accordance with customer requirements, terms of reference and standards. SC 5. Ability to comply with specifications, standards, rules and guidelines in the professional sector when implementing software life cycle processes. SC 9. Ability to assess and consider economic, social, technological and environmental factors affecting professional activities.

Integrated final program learning outcomes encouraged by the academic discipline:

Program learning outcomes	PLO 1. To analyze, intentionally search for and select information and reference resources and knowledge required to solve professional problems, taking into account current scientific and technological achievements. PLO 2. To know the code of professional ethics, understand the social significance and cultural aspects of software engineering, as well as observe them in professional activities. PLO 4. To know and apply professional standards and other regulatory documents in the software engineering sector. PLO 7. To know and apply the fundamental concepts, paradigms and key operational principles of language, instrumental and computational software engineering tools in practice. PLO 10. To conduct a pre-project examination of the subject area and the system analysis of the design object. PLO 12. To apply efficient software design approaches in practice. PLO 14. To apply instrumental software tools for domain analysis, design, testing, visualization, measurement and documentation in practice. PLO 16. To have skills of team development, coordination, design and release of all types of software documents. PLO 22. To know and be able to apply project management techniques and tools.

	PLO 23. To be able to document and present the results of software development.

2. ORGANIZATION AND MANAGEMENT OF PRACTICAL TRAINING

Control over the students' compliance with the practical training requirements is carried out in two forms: current and final:

- current control is carried out by the supervisor of technological practical training from the Department and the head of the practical base; the current control checks: the timeliness of filling out the record book, the implementation of the schedule of work, individual tasks, etc.;
- final control is carried out during the defense of the report on practical training.

The main document of the student is considered a calendar schedule of practical training, in fact, the working program of practical training, which takes into account the degree of theoretical training of the student, the specifics of a particular place of practical training. Individual calendar schedule is developed by the supervisor of practical training from the Department and agreed with the head of the practical base. It reflects the specific character of practical training, includes a set of specially selected training and real tasks, calendar dates for the implementation of individual stages, as well as stipulates the advancement of the student at different workplaces for the implementation of the practical training program as a whole.

The individual calendar schedule can stipulate the fulfillment of certain tasks (works) by students. This work should be organized in such a way that the student could, on the one hand, assist the enterprise where he/she is interning, and on the other hand, deeply learn and acquire professional skills in the specialty.

The work of students at the practical base from the first day should be planned in such a way that each student has a clear plan (schedule) of practical training with the definition of the content and timing of individual stages of practice.

The fulfillment of the individual schedule should be recorded by students in the record book.

The practical training supervisor from the Department may allow students to work during the internship at free workplaces (remote workplaces), provided that the latter meet the requirements of the internship program, and students successfully perform it. Students must be provided with all necessary information about activities of the enterprise, the practical base and be assigned to a specialist from the enterprise to monitor the student's work during the internship. But regardless of this, all students for the duration of the internship should be provided with specially equipped places for work.

Workplace of students in the course of internship is divisions of enterprises, the activities of which are related to activities of the enterprise in terms of software development.

The organization of technological practical training shall include:

- registration and receipt of passes to the enterprise;

- studying safety rules;
- conducting training sessions and industrial excursions;
- fulfillment of individual tasks;
- fulfillment of independent tasks at technological departments and other services of the enterprise;
- drawing up the report;
- submission of the report on practical training to the Department.

Control over technological practical training is aimed at:

- providing practical assistance to students in the implementation of the internship program;
- identifying and eliminating shortcomings in practical training.

Control is carried out by the supervisor of practical training from the University and the enterprise, the head of the Graduating Department.

The supervisor shall report to the university administration and the enterprise about any serious shortcomings found. In order to improve the efficiency of control student practitioners should regularly (daily) fill out the record book of practical training.

Specificity of technological activities of enterprises of different profiles, forms of ownership, organizational structures determines certain differences in the content of practical training. Depending on the practical base, its content is specified by the schedule of practical training. If necessary, the supervisor of practical training from the University, at the request of the supervisor of practical training from the enterprise and in agreement with him/her, can develop an individual program of practical training at the enterprise.

During practical training, students are obliged to:

- make a note in the record book on the date of arrival to practical training on the first day;
- be instructed on safety, come to the supervisor of practical training from the enterprise - the practical base, examine the program (schedule) and individual task, receive instructions on practical training and agree on the time and place of consultations;
- receive (if necessary) a temporary pass to enter the enterprise;
- fully complete the program and individual tasks of practical training; record the completed tasks in the record book;
- collect material for writing a report, process it in a timely manner, write a report;
- observe labor discipline and internal regulations at the practical base;
- responsible for the work assigned by the supervisor from the practical base.

On the last day of practical training, students are obliged to:

- receive a characterization of his/her work compiled and signed by the supervisor from the practical base through his/her feedback and evaluation;
- make a note of the date of completion of practical training and departure

from the place of its completion, hand over the materials obtained at the enterprise during practical training, hand over the pass.

After returning from the practical base, students are obliged to:

- inform the Department about the end of practical training;
- duly execute the report on practical training within one day;
- submit the report together with the necessary documents and the record book to the supervisor of practical training from the Department for verification;
- defend the report on practical training on the day appointed by the supervisor of practical training from the Department;
- get advice from the supervisor on the processing of the material collected during practical training.

3. CONTENT OF THE TECHNOLOGICAL PRACTICAL TRAINING PROGRAM

3.1. General introduction to enterprise activities

At the beginning of practical training, it is necessary to get acquainted with the organization of enterprise activities, its organizational management structure, specifics of the technology of software product (services) development.

3.2. Introduction to the specifics of activities of technological services at the enterprise

It is necessary to determine the specifics of activities of all services of the enterprise involved in the technological process of software product development, to analyze the organizational structure of management of the division, to consider the regulations of the department, job duties of each employee of the service and to determine the relationship of the service with other departments of the enterprise, as well as each employee separately.

3.3. Organization of the technological process of software development

Pay attention to the nature of technology and organization of activities, management system, the formation of information system of the enterprise, sources of information formation, both primary and secondary. Examine the implementation of the collection, analysis, systematization of scientific and technical information, how to summarize the best domestic and foreign experience at the stage of research to justify software solutions using modern scientific and technical, reference literature, information and reference systems, Internet search engines.

It is necessary to pay attention to the system of information processing, availability of technological computer programs, learn how they work. Determine the main technological methods, see the ability to implement other methods and means at the enterprise.

Get acquainted with the experience of designing programs and other automated information systems, take part in the development of the project of systems and software, contributing to the development of project documentation, particularly in the software development.

3.4. Product policy of the enterprise, life cycle of a software product

Study the product range of the enterprise, determine the life cycle stages for each software product, competitive properties of each product, determine product management. Get acquainted with the subject area modeling, determination of software requirements, software structure and its design.

Examine the full cycle of product development from the stage of idea creation to implementation and revision, functionality update, feedback from users and product improvement.

3.5. Marketing policy of the enterprise

Acquire knowledge about digital marketing areas of IT products.

Develop basic hard and soft skills to take the first steps in the marketing team of the IT product.

Produce analytical skills and IT market research skills.

3.6. Business planning

Explore the system of plans of the enterprise, the process of formation of the strategic plan of the enterprise.

Determine on what basis operational plans, new product development plans, etc. are formed.

3.7. Control over implementation of measures

Examine the system of evaluation of efficiency of taking planned measures, types of control applied by the enterprise (input, intermediate, output) and their efficiency.

4. GUIDELINES FOR THE IMPLEMENTATION OF THE TECHNOLOGICAL PRACTICAL TRAINING PROGRAM

The main outcome of practical training for students is the fulfillment of the calendar schedule, preparation and defense of the report. The basic document recording the process of the student's practical training is the record book on practical training. The written report combines all sections of the practical training program.

The period of completion of practical training allows students to really assess their strengths, to identify the main shortcomings in theoretical training with the help of the lecturer, to obtain skills for further activities.

During practical training, students can accumulate a significant amount of information. In this case, the lecturer and the supervisor of practical training from the enterprise should teach students to design reporting materials correctly, compliance with the sequence and accuracy of presentation, as well as to select the most appropriate things. Therefore, in addition to entries in the record book about the work done, it is important for students to make a report on the completion (fulfillment of the schedule) of practical training by sections.

4.1. Rules of record book keeping and design

1. During practical training, students should write down everything that they have done according to the calendar plan of practical training in the record book

every day with a short pen. They keep more detailed records in workbooks, which are a continuation of the record nook and is the basis for further preparation of the report on practical training. The record book shall be drawn up on an A4 sheet. The form of the title page of the record book is given in Annex 1.

2. At least once a week, students are obliged to submit the record book for revision to practical training supervisors from the University and the practical base who check the record book, make written comments, give additional tasks and sign the records made by students.

3. After completion of practical training, the completed record book shall be submitted to practical training supervisors from the education institution and the practical base.

4. Students shall defend the completed record book with reviews and signatures of supervisors, the seal of the enterprise before the committee of the education institution.

5. Practical training is not credited without a completed record book.

4.2. Plan of the report on the fulfillment of the practical training program

Students highlight all the work done during practical training in the report on practical training. Besides, students should proceed from the role as a software developer conducting work to solve the assigned task.

The report should contain not only the summarized data obtained during practical training but also students' own conclusions and suggestions. The content of the report is presented by stages according to the practical training program, i.e., it should have 7 sections (other forms of the report offered by the Department in individual cases can also be used):

1. Introduction specifying the goal and objectives of practical training.
2. Characteristics of the enterprise (name, organizational and legal form, key activities), its technological services, economic activities.
3. The task set by the supervisor of practical training.
4. The content of the work performed during practical training.
5. Conclusions about the results of practical training and suggestions on improving enterprise activities.
6. List of literature used.
7. Annexes.

4.3. Report design requirements

The student's report on practical training is typed on the computer:

page parameters: format – A4 (21cm x 29.7cm.).

margins: on the left side – 30 mm, on the right side, top and bottom – 20 mm.

font format: *in the text:* Times New Roman; font size – 14; line spacing – 1.5; paragraph indentation – 10 mm; *in tables:* Times New Roman; font size – 8, 10, 12 or 14; line spacing – 1.0.

Sheets are collected (stapled) in a notebook. The form of the title page of the report is given in Annex 2.

A new section should be started from a new sheet.

Sections of the report are numbered according to the following pattern: **SECTION 1** (Times New Roman; font size – 14, all letters are capitalized, bold, placed in the middle of the text), section title – Times New Roman; font size – 14, the first letter is capitalized, italicized, bold, placed in the middle of the text.

Subdivisions shall be numbered: 1.1., 1.2., 1.3., ...2.1., 2.2., ..., etc. and shall be in the font according to the previously specified sample.

When illustrated material (figures, graphs, charts, diagrams, schemes) is used in the report, the numbering is made with several digits, indicating the number of the subsection and the serial number of the illustration (e.g., Figure 1.1, Figure 1.2). The title is placed directly under the figure (Times New Roman; font size 14, first letter capitalized, placed in the middle of the text).

It is recommended to present digital material by means of tables. Each of them should have a meaningful title placed under the word 'Table' (font size – 14, first letter capitalized, placed on the right side of the text) above the corresponding table. Then the name of the table (font size – 14, first letter capitalized, placed in the middle of the text). Tables are numbered in the same way as illustrations. The table should be placed after the reference to it in the text (for example: see Table 1.2.), after which it is analyzed. In the header of the table font according to the following requirement: font size – 12 or 14; line spacing – 1.0.

The list of information sources includes all sources used when preparing the report. Information sources should be referenced in the text of the report (in square brackets with figures indicating the number of the source in the list and the page from it, if necessary).

Auxiliary material (instructions, large tables, illustrations, separate schemes, etc.) should be placed in annexes, each of them should be given a meaningful title and sequential number in Arabic numerals, and a reference to the corresponding annex should be made in the text.

The reliability of the information presented in the report is confirmed by samples of organizational, administrative, planning, financial and other documents.

The student's report on practical training should have letter numbering, starting with the number 3, starting with the introduction, be sealed (stapled). Page numbering is placed in the upper right corner of the sheet.

The title page of the report shall contain a personal signature of the supervisor of practical training from the Department, specifying his/her fullname, personal signature of the supervisor of practical training from the enterprise, specifying the position; full name, personal signature of the student. All must be certified by the seal of the enterprise where the student was practicing.

5. RESULTS OF TECHNOLOGICAL PRACTICAL TRAINING AND ITS DEFENSE

Students shall submit a properly executed report, an executed record book, a completed review of the head of practical training from the enterprise (the form is given in Annex 3) to the Department, to the head of practical training from the University for verification within one day after the end of practical training. Students

are not allowed to take a Pass/Fail test without the prepared documents. The supervisor of practical training from the University draws up a conclusion and assesses practical training (form – Annex 4).

Students defend the report on practical training before the committee appointed by the Department. The committee consists of practical training supervisors from the University, lecturers of the Department teaching special disciplines and, if necessary, supervisors from practical bases.

According to the results of checking the report, its defense by the student, as well as monitoring of the fulfillment of the calendar schedule of practical training, one provides detailed characteristics of the student's work in obtaining practical knowledge expressed by putting a complex differentiated grade. The assessment of practical training is put in the student's academic record, individual study plan and student's credit book.

A student who does not comply with the requirements (assignments and schedule of practical training), who received a negative feedback from supervisors and unsatisfactory grade during the defense (recorded in the exam sheet), is appointed to practical training during holidays.

A student failing to fully complete the schedule and assignment of practical training for valid reasons (prolonged illness etc. confirmed by appropriate documents) shall write an application, on the basis of which the order extends the term of practical training. After its completion, the defense of the report is made on general grounds.

The results of each practical training are discussed at meetings of the Department.

6. ASSESSMENT CRITERIA FOR TECHNOLOGICAL PRACTICAL TRAINING

The results of the student's practical training are assessed according to the following criteria:

- availability of all necessary documents accompanying the process of practical training;
- availability of obligatory formal elements of the report;
- independence of report fulfillment;
- depth of fulfillment of practical tasks;
- validity of ideas and conclusions of students;
- successful defense of the report on practical training by the student.

The final grade for practical training can be determined by the following criteria:

- ***excellent (90-100 points)*** – all necessary documents on practical training are available; the report is written independently with observance of all requirements; tasks of practical training are elaborated and fully covered; high level of preparation of the student; successfully received answers to questions on the report.

- ***good (74-89 points***) – all necessary documents on practical training are available, but some details are missing; the report is written independently but not complied with all requirements; tasks of practical training are not fully elaborated and covered; the report is successfully defended but with remarks.
- ***satisfactory (60-73 points)*** - all necessary documents on practical training are available, but some details are missing or inaccurate data are entered; the report is made with plagiarism, without references; formal requirements are violated; tasks are not fully covered; the student has demonstrated a trend in using other people's ideas and conclusions; the report is barely defended due to insufficient answers to defense questions.
- ***fail (less than 60 points)*** – there is no one or more documents on practical training; some details are missing or unreliable; the report is completely based on plagiarism without references; formal requirements are not met; tasks of practical training are done but not covered; the student has demonstrated a trend in using other people's ideas and conclusions; the report is not defended due to inadequate answers to questions for defense in poor orientation in report materials.

The total final grade for practical training in points, according to the national and ECTS scale, is entered in the credit and examination record and the student's credit book.

7. RECOMMENDED READING:

Basic:

1. Eric J. Braude. Software Engineering Technology. Translated from English. M.: Computer Science, 2004. 655 p.

2. Fundamentals of software system quality engineering / F.I. Andon, G.I. Koval, T.M. Korotun, E.M. Lavrischeva, V.Y. Suslov / Edited by I.V. Sergienko. K.: Akademperiodika. 2007. 672 p.

3. Systems and software engineering – Software Life Cycle Processes. ISO 12207:2008. 122 p. (International Standard).

4. IEEE Standard Glossary of Software Engineering Terminology, Glossary. IEEE Std 610.12-1990. (Industry Standard).

5. Ian Sommerville. Software Engineering. Translated from English. Williams Publishing House. 2002. 624 p.

6. I. Jacobson, G. Booch, J. Rumbaugh. The Unified Software Development Process. Translated from English. Peter, 2002. 496 p.

7. H. Schildt. C++: The Complete Reference. Translated from English. Williams Publishing House. 2006. 800 p.

Internet sources:

1. Official website of International European University // Electronic resource. – Available at: https://ieu.edu.ua.

2. Official website of the Vernadsky National Library of Ukraine // Electronic resource. – Available at: https://nbuv.gov.ua/
3. Website of free electronic textbooks online // Electronic resource. – Available at: https://pidru4niki.com
4. Official website of CHITALKA student electronic library // Electronic resource. – Available at: http://chitalka.info.
5. Official website of the online library of educational and scientific literature // Electronic resource. – Available at: https://eduknigi.com.

Annex 1. Form of the title page of the record book of practical training

INTERNATIONAL EUROPEAN UNIVERSITY

EDUCATION AND RESEARCH INSTITUTE "EUROPEAN BUSINESS SCHOOL"

Department of Information Technology

RECORD BOOK OF
TECHNOLOGICAL PRACTICAL TRAINING

Student:_____
(full name, signature)

year:_____, group:_____

Specialty: 121 Software Engineering

Arrived at the enterprise on _____

Seal _____ _____ ___, 20__
(signature)

Left the enterprise on _____

Seal _____ _____ ___, 20__
(signature)

Kyiv – 20___

Annex 2. Form of the title page of the report on practical training

INTERNATIONAL EUROPEAN UNIVERSITY

EDUCATION AND RESEARCH INSTITUTE “EUROPEAN BUSINESS SCHOOL”

Department of Information Technology

REPORT
on Technological practical training

Student:_____
(full name, signature)

year:_____, group:_____

Supervisor of practical training from IEU

__professor O.V. Nesterenko____ _____
(title, full name) (signature)

Supervisor of practical training from_____
(name of institution, enterprise)

_____ _____
(position, title, full name) (signature)

KYIV – 20__

Annex 3. Form of the feedback from the supervisor of practical training from the enterprise

FEEDBACK AND ASSESSMENT
from the supervisor of practical training from the enterprise

Student:_____
(full name)
at
_____
(institution, enterprise)
_____
_(division)

_____

_____

_____

_____

_____

_____

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_____

_____

_____

Supervisor of practical training from the institution, enterprise

_____ _____
(position, title, full name) (signature)

Seal

_____ ____, 20__

Annex 4. Form of the feedback from the supervisor of practical training from the University

FEEDBACK AND ASSESSMENT
from the supervisor of practical training from the enterprise

Student:_____
(full name)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Supervisor of practical training from the University

_____ _____
(title, full name) (signature)

Grade for practical training: _____

_____ ____, 20__