National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Computer Systems Software Department

SCIENTIFIC-RESEARCH PRACTICE OF MASTERS OF EDUCATIONAL AND SCIENTIFIC FIELD OF TRAINING

Syllabus

Course Requisites

Cycle of Higher Education	***Second (master's)***

Field of Study	*12 Information Technologies*
Speciality	*121 Software engineering*
Educational program	*Software Engineering of Multimedia and Information Retrieval Systems*
Discipline status	*Normative*
Study form	*Full-time*
Year of study, semester	*2nd year, 4 semester*
ECTS workload	*10 credits (ECTS).*
Testing and assessment	*Final test*
Course Schedule	*7 weeks, according to the University Order*
Language	*English*
Course Instructors	*PhD., Associate Professor, Vasyl Yurchyshyn, vasylPZKS@gmail.com*
Access to the course	*Google classroom, http://fpm.kpi.ua/archive*

Outline of the Course

1. Course description, goals, objectives, and learning outcomes

Research practice is one of the important practical disciplines of training specialists in higher education. Research practice is one of the final stages of training in the educational and scientific field of training in higher education institutions of Ukraine. Master's research practice is a mandatory component of the educational-scientific program of master's training in the specialty 121 Software engineering of the educational program "Software engineering of multimedia and information-search systems" is aimed at the student's acquisition of professional skills and the ability to carry out independent research work .

The purpose *of the credit module is to form students' ability to systematize, expand and consolidate professional knowledge; to form the initial competencies of conducting independent scientific work; conduct independent research and experiments. The essence of research practice is to involve graduate students in independent research work, familiarization with the methodology of conducting research work in academic and specialized institutes, leading companies.*

The subject *of "Research practice" is to deepen the skills of independent scientific work, expand the scientific worldview of students, research the chosen problem and the ability to connect it with the theoretical direction of research, determine the structure, logic and content of the future master's work.*

Completion of "Research practice" contributes to the formation of general (GS) and professional competences (PC) in students, necessary for solving practical tasks of professional activity:
GS 01 Ability to abstract thinking, analysis and synthesis.
GS 03 Ability to conduct research at an appropriate level.
GS 04 Ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity).
GS 05 Ability to generate new ideas (creativity).
PC 01 Ability to analyze subject areas, form, classify software requirements.

PC 02 Ability to develop and implement scientific and/or applied projects in the field of software engineering.
PC 03 Ability to design the software architecture, to model the functioning processes of individual subsystems and modules.
PC 04 Ability to develop and implement new competitive ideas in software engineering.
FC 05 Ability to develop, analyze and apply specifications, standards, rules and recommendations in the field of software engineering.
PC 06 Ability to effectively manage financial, human, technical and other project resources in the field of software engineering.
PC 07 Ability to think critically about problems in the field of information technology and at the boundaries of fields of knowledge, integrate relevant knowledge and solve complex problems in broad or multidisciplinary contexts.
PC 08 Ability to develop and coordinate processes, stages and iterations of the software life cycle based on the application of modern software development models, methods and technologies.
PC 09 Ability to ensure software quality.
PC 10 Ability to plan and perform scientific research on software engineering
software.
PC 11 Ability to apply and develop fundamental and interdisciplinary knowledge for
successful solution of scientific problems of software engineering.

Completion of "Research practice" contributes to students' formation of the following program learning outcomes (PLO) according to the educational program:

PLO 01 Know and apply modern professional standards and regulatory documents on software engineering.
PLO 02 Evaluate and choose effective methods and models of software development, implementation, maintenance and management of relevant processes at all stages of the life cycle.
PLO 03 Build and research models of information processes in the applied field.
PLO 04 Identify information needs and classify data for software design.
PLO 05 Develop, analyze, justify and systematize software requirements.
PLO 06 Develop and evaluate software design strategies; substantiate, analyze and evaluate options for project solutions from the point of view of the quality of the final software product, resource limitations and other factors.
PLO 07 Analyze, evaluate and apply modern software and hardware platforms at the system level to solve complex software engineering problems.
PLO 08 Develop and modify software architecture to implement customer requirements.
PLO 09 Reasonably choose programming paradigms and languages for software development; apply modern means of software development in practice.
PLO 10 Modify existing and develop new algorithmic solutions for detailed software design.
PLO 11 Ensure quality at all stages of the software life cycle, including using relevant models and evaluation methods, as well as means of automated software testing and verification.
PLO 12 Make effective organizational and management decisions in conditions of uncertainty and changing requirements, compare alternatives, assess risks.
PLO 17 Collect, analyze, evaluate information necessary for solving scientific and applied problems, using scientific and technical literature, databases and other sources.
PLO 19 Formulate, experimentally verify, substantiate and apply in practice innovative methods and competitive technologies for solving professional, scientific and technical problems in multidisciplinary contexts in the process of software development.
PLO 20 Plan and carry out scientific research in the field of software engineering, choose methods and tools, analyze results, justify conclusions.

2. Pre-requisites and post-requisites of the discipline (place in the structural and logical scheme of training according to the relevant educational program)

Successful completion of the "Research practice" is preceded by the study of the disciplines of the curriculum of bachelor's and master's training in the specialty 121 Software engineering. Completion of the "Research Practice" will ensure the implementation of independent research work and preparation of materials for writing a master's thesis in the specialty 121 Software Engineering; experience in designing, developing, deploying, integrating, testing, implementing and operating software for various purposes.

3. Content of the academic discipline

The organization and conduct of research practice are regulated by the following documents:
- contracts with enterprises regarding the completion of scientific research practice by students;
- the order of the university on the referral of students to research practice and the appointment of managers from the university;
– educational program and work program of scientific research practice;
– diaries and individual tasks for students to complete research practice;
– journal of students' visits to research practice;
– schedules of visits to bases of research practice by its managers for the purpose of control;
- reports of students on the implementation of the program of scientific research practice;
- examination information regarding credit from research practice.
Students are sent to practice according to the order of the university. The order determines the type of practice, the terms and place of its completion, the distribution and confirmation of students according to the supervisors from the department, etc. The form of the order is determined by the current regulations of NTUU KPI named after Igor Sikorsky.

4. Educational materials and resources

Basic literature:

1. Regulations on the organization of the educational process at Igor Sikorskyi KPI: approved by the order of the Rector, ORDER No. 7-124 dated 07/20/2020. [electronic resource] . - Access mode - https://document.kpi.ua/regulations. - Title from the screen. - Ukrainian language.

2. The regulations on the procedure for the practice of higher education applicants of the National Technical University of Ukraine "Ihor Sikorskyi Kyiv Polytechnic Institute" were approved by the order of the Rector, ORDER No. 7/172 dated 09/24/2020. [electronic resource] . – Access mode - https://document.kpi.ua/files/2020_7-172.pdf. - Title from the screen. - Ukrainian language.

3. Methodological recommendations on the organization of students' practice and the preparation of practical work programs of the National Technical University of Ukraine "Ihor Sikorskyi Kyiv Polytechnic Institute" [Text] / Composer: N.M. Lapenko, I.L. Spivak, I.V. Fedorenko, O.M. Shapovalova; in general ed. P.M. Yablonsky. - K.: KPI named after Igor Sikorskyi, 2018. – 29 p.

4. Law of Ukraine On Higher Education: / Verkhovna Rada of Ukraine; Bulletin of the Verkhovna Rada (VVR), 2014, No. 37-38, Article 2004 -. – Kyiv, 2018. – Title from the screen.

5. Provisions on internships for students of higher educational institutions of Ukraine: Order of the Ministry of Education of Ukraine dated 08.04.1993 No. 93 (Amended by Order of the Ministry of Education No. 351(v0351281-94) dated 20.12.94.

6. Provisional regulation on the organization of the educational process in KPI named after Igor Sikorskyi [Text] / Composed by V.P. Golovenkin; in general ed. Yu.I. Yakymenko – Kyiv: KPI named after Igor Sikorskyi, 2017. – 156 p.

Educational content

5. Methods of mastering an educational discipline (educational component)

Research practice can take place at an enterprise, organization or educational institution.
Management of scientific research practice on the part of the university is carried out by the teacher of the department, responsible for the completion of scientific research practice, the supervisor of the final qualification work, on the part of the company - a manager from among specialists according to the specialty profile.
The head of research practice from the department ensures the implementation of all organizational measures before the start of research practice: briefing on the procedure for conducting research practice; provision of necessary documents to student interns: referral to research practice, diary of research practice.
The thesis supervisor provides advice on issues related to writing a master's thesis.
Research practice begins with mandatory safety training for all students at the enterprise and workplaces, familiarization with the rules of the internal procedure.
Regulations on the conduct of research practice for higher education applicants of KPI named after Igor Sikorskyi (Order No. 7-172 dated September 24, 2020) regulates the duties of the head of research practice and the student.

The head of research practice from the department must:

- develop work programs of research practice and coordinate them with the bases of research practice no later than two weeks before the start of research practice;

- warn students about issuing a medical certificate about their health (if necessary) 7 days before the start of research practice;

- no later than 7 days before the start of the research practice, provide the research practice databases with lists of student interns for issuing temporary passes;

- to prepare for providing a student or a group of students with a referral for scientific research practice; when two or more students are sent to undergo research practice, appoint a senior group member who is an assistant to the head of research practice;

- hold meetings with students and familiarize them with the working programs of scientific research practice; issue diaries to students with an individual task and a calendar plan for scientific research practice; to ensure the timely arrival of students at the bases of research practice and to monitor the passage of research practice;

- systematically, at least once a week, advise students and monitor the stages of individual task performance according to the calendar plan; to help the head of research practice from the enterprise in compiling the characteristics of each student;

- participate in accepted credits from research practice;

- check that all students return passes, literature and property to the enterprise;

- draw up a logbook of going to work, as well as conduct a briefing on safety techniques, if students undergo scientific research practice in the structural units of the university;

- to submit to the dean's office a report on the results of scientific research practice with proposals for its improvement.

University students are obliged to:

- before the start of research practice, receive from the head of research practice at the department referrals for research practice, a work program of research practice and a diary of research practice;

- arrive on time at the base of research practice;

- to fully perform all the tasks stipulated by the work program of scientific research practice and the instructions of its managers;

- to know and strictly follow the rules of occupational health and safety, safety and industrial sanitation, and internal regulations of the enterprise;

- to be responsible for the work done;

- timely draw up a report and make a credit for scientific research practice.

The main document, which is used to control the completion of scientific research practice, is the diary of scientific research practice, which is issued by the department. The diary contains an individual task, a calendar plan for conducting research practice, and weekly entries. The heads of research practice from the department and the base of research practice check the diary every week and write down their comments. The supervisor of the master's thesis supervises the implementation of the individual task. After the end of the period of research practice, the head of the base of research practice gives a feedback in the diary about the completion of the research practice by the student and evaluates its results with a grade, the supervisor of the master's thesis writes a review about the state of the master's thesis in the diary.

6. Independent work of a student/graduate student

During the course of scientific research practice, the student must complete the following amount of work:
1. Definition of the object and subject of research taking into account the base of research practice (enterprise/institution).
2. Together with the scientific supervisor of the master's thesis, form the content of the individual task.
3. Determination of the terms and scope of the necessary theoretical studies and calculations.
4. Collection and systematization of information about the object of research.
5. Description of the research object model.
6. Evaluation of relationships between model elements.
7. Clarification of the topic of the master's thesis. Formulation of the statement of the problem for writing a master's thesis.
8. Analysis and selection of methods and technologies for the implementation of the given task.
9. Forming a report on research practice.

Policy and control

7. Policy of academic discipline (educational component)

Requirements for the report on research practice:

After the end of the research practice, students must submit a written report together with the diary to the head of the practice from the department within the set deadline (no later than three days after the end of the research practice) for verification, review and admission to the defense. The written review of the supervisor of research practice from the department and the supervisor of the master's program are entered in the student's diary.

The research practice report must contain information about the student's performance of the research practice program and the individual task. Systematization of the collected materials is carried out by the student during research practice and is completed during the time specially allocated for this purpose, in accordance with the program of research practice.

The structure and content of the sections of the report on research practice:

A report on research practice consists of the following sections or documents:

1. Title page of the report (according to the sample).

2. Content of the report on research practice.

3. Introduction with a brief overview of the problem area on which the master's thesis is being performed, a brief argumentation of the relevance of the declared research, a brief annotation of the sections of the report.

4. Formalization of the statement of the task of the master's thesis (object, subject and purpose of the research, the final result of the master's thesis).

5. The first full version of the master's thesis with all completed sections and appendices. The master's thesis consists of the following elements:

– Title page of the prescribed sample;

- Tasks for a master's thesis" of the established model;

– Abstract (in Ukrainian);

– Abstract (abstract in English);

– Content;

– List of conventional designations, abbreviations and terms;

– Introduction;

– The main part with a list of sections;

– Conclusions;

- References;

– Appendix A to the master's thesis - Demonstration version of the software (architecture, brief description of functionality, programming language, results of the software, etc.).

– Appendix B to the master's thesis - Presentation of the first full version of the MD with completed all Sections.

– Appendix B to the master's thesis - theses of a report at a selected conference or another publication on the topic of MD (published or accepted for publication) in a professional publication.

6. Conclusions to the report.

Summarizing the results of research practice:

The report is defended by the student at the commission appointed by the head of the department. The commission includes heads of research practice from the department and two teachers of the department. The commission accepts credit during the first 3-5 days after the end of the research practice.

For admission to credit for research practice, a student must submit to the commission (no later than three days before the end of research practice) for verification and review:

1) report on research practice;

2) presentation of a report on research practice;

3) diary of research practice.

8. Types of control and rating system for evaluating learning outcomes

Current control: checking the research practice diary every week. Calendar control: checking the execution of four classes of tasks according to the calendar plan.

Semester control: defense of a report on research practice, credit. Conditions for admission to the semester control: minimum positive assessment for the performance of an individual task - 60 points.

Evaluation criteria:

1) Availability of documents: report on research practice; presentation of a report on research practice; diary of research practice - 60 points.

2) Protection of the report of scientific research practice and implementation of an individual task of scientific research practice.

Evaluation criteria:

1) complete completion of an individual task - 40 points;

2) incomplete completion of an individual task - 10-20 points;

3) sufficient correspondence of the content of the individual task - 0 - 5 points.

Table of correspondence of rating points to grades on the university follows:

Points	*Grade*
100-95	Excellent
94-85	Very good
84-75	Good
74-65	Satisfactorily
64-60	Enough
< 60	Unsatisfactorily
Admission conditions are not met	Not admitted

Course syllabus:

Is created by PhD, Associate Professor Vasyl Yurchyshyn

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