National Technical University of Ukraine "KYIV POLYTECHNIC INSTITUTE named after IGOR SIKORSKY"

Radio Engineering Department

Pre-diploma Practice (PN 01) Curriculum (Syllabus)

Details of the academic discipline

Level of higher education	***First (bachelor's)***
Field of knowledge	17 – *Electronics, automation and electronic communications*
Specialization	*172 Electronic Communications and Radio Engineering*
Educational program	*"Information and Communication Radio Engineering"*
Status of discipline	Compulsory component of the professional training cycle
Form of study	Full-time (daytime), accelerated full-time
Year of training,	4th year, 8th semester (full-time); 3rd year, 6th semester (full-time
Scope of the discipline	180 hours / 6 ECTS credits
Semester control/ assessment measures	Final-test
Class schedule	https://schedule.kpi.ua
Language of instruction	Ukrainian
Information about the course leader/teachers	Candidate of Technical Sciences, Associate Professor, Associate Professor of the Radio Engineering Department Sergii Litvintsev, litvintsev.sergii@lll.kpi.ua Candidate of Technical Sciences, Associate Professor, Associate Professor of the Radio Engineering Department Elena Guseva, guseva.elena@lll.kpi.ua
Teacher profile	https://intellect.kpi.ua/profile/gov111
Course placement	

Curriculum

1. Description of the academic discipline, its purpose, subject matter, and learning outcomes

Description of discipline	Pre-diploma practice is the final stage of professional and practical training for higher education students enrolled in a bachelor's degree program. It is based on all the knowledge that students have acquired during their studies at the university. Students undergoing pre-diploma practice must have a thorough command of their specialty, have a high level of scientific and practical training, be skilled organizers, be able to apply the principles of scientific work organization in practice, and be able to work with people. Pre-diploma internship is designed to develop the professional skills of future university graduates, their ability to make independent decisions in a specific area of work in real

	production conditions by performing various duties in production conditions that are characteristic of their future professional and organizational-managerial activities. The set goals are achieved through independent study of production and the performance by each student of the individual engineering and production tasks required by the program in the conditions of the enterprise (institution).
Aim of discipline	- practical training for independent work in the initial position of engineer, junior researcher, or foreman; - deepening and consolidating theoretical knowledge by solving engineering and research problems related to the design of radio engineering devices; - mastering modern methods, forms of work organization, and tools in the field of electronic communications and radio engineering.
Subject of study	– collection of technical and economic materials on the topic of the diploma project (work); – familiarization with the content and nature of the work of an engineer, junior research assistant, and workshop master in the laboratories of research organizations, laboratories, and other radio engineering departments of factories and installation organizations.
Learning results	
Integral competence	**IC** Ability to solve complex specialized tasks and practical problems in the field of electronic communications and radio engineering or in the learning process, which involves the application of theories and methods of radio engineering sciences and information technologies and is characterized by complexity and uncertainty of conditions.
General competencies (GC)	**GC 01** Ability to think abstractly, analyze, and synthesize **GC 02** Ability to apply knowledge in practical situations **GC 03** Ability to plan and manage time **GC 04** Knowledge and understanding of the subject area and understanding of professional activities **GC 06** Ability to work in a team **GC 08** Ability to identify, pose, and solve problems
Professional competencies (PC)	**PC 02** Ability to solve standard professional tasks based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security **PC 03** Ability to use basic methods, means, and tools for obtaining, transmitting, processing, and storing information **PC 04** Ability to perform computer modeling of devices, systems, and processes using universal application software packages **PC 05** Ability to use regulatory and legal documentation related to information and telecommunications networks, telecommunications and radio engineering systems (laws of Ukraine, technical regulations, international and national standards, recommendations of the International Telecommunication Union, etc.) to solve professional tasks **PC 06** Ability to perform instrumental measurements in information and telecommunications networks, telecommunications and radio engineering systems **PC 15** Ability to perform calculations in the process of designing structures and means of information and telecommunications networks, telecommunications and radio engineering systems, in accordance with technical specifications using both standard and independently developed methods, techniques, and software tools for design automation **PC 16** Ability to calculate the main parameters of various types of antennas and microwave devices, select the most effective antennas and microwave devices for radio engineering systems with specified operating modes and functional characteristics, experimentally study the characteristics and devices of microwave antennas of various designs and frequency ranges **PC 17** Ability to apply modern CAD systems for the design, structural synthesis, and

	highly efficient multi-parameter optimization of antennas, active and passive microwave devices **PC 18** Ability to analyze, evaluate characteristics, and design modern low-noise microwave receivers ( ) for information and communication systems **PC 19** Ability to apply and analyze various types of signal modulation and coding in radio communication channels of modern information and communication radio frequency systems **PC 20** Ability to select random signal parameters and optimize the communication channel according to the required criteria in the presence of noise and interference, perform engineering calculations of the main characteristics of random signals and devices for their processing **PC 21** Ability to design radio frequency printed circuit boards and microwave module structures **PC 23** Ability to calculate the modes of electronic circuits at constant, harmonic, and any current in linear circuits with concentrated parameters; experimentally investigate the characteristics of the main radio-electronic circuits and provide a theoretical justification for them
Program learning results (PLR)	**PLR 01** Analyze, argue, and make decisions when solving specialized tasks and practical problems in telecommunications and radio engineering, which are characterized by complexity and incomplete certainty of conditions **PLR 02** Apply the results of personal research and analysis of information to solve qualitative and quantitative problems of a similar nature in information and communication networks, telecommunications and radio engineering systems **PLR 03** Identify and apply in professional activities methods for testing information and telecommunications networks, telecommunications and radio engineering systems for compliance with the requirements of domestic and international regulatory documents **PLR 04** Explain the results obtained from measurements in terms of their significance and relate them to the relevant theory **PLR 05** Skills in evaluating, interpreting, and synthesizing information and data **PLR 06** Competently apply terminology in the field of telecommunications and radio engineering **PLR 08** Describe the principles and procedures used in telecommunications systems, information and telecommunications networks, and radio engineering **PLR 13** Apply fundamental and applied sciences to analyze and develop processes occurring in telecommunications and radio engineering systems **PLR 14** Apply understanding of the basic properties of the component base to ensure the quality and reliability of telecommunications and radio engineering systems and devices **PLR 18** Find, evaluate, and use information from various sources necessary for solving professional tasks, including reproducing information through electronic search **PLR 24** Perform calculations, numerical optimization, and design of antennas and microwave devices, active microwave receiving systems using modern CAD systems **PLR 25** Perform calculations of transient processes in electronic circuits with concentrated parameters, apply circuit function apparatus to study the frequency and time characteristics of radio-electronic circuits **PLR 26** Calculate and design low-noise receivers for information and communication radio systems **PLR 27** Select modulation parameters and apply methods of noise-resistant and efficient coding of information and communication radio systems

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

The discipline is interdisciplinary in nature. It is the foundation for preparing a certification thesis for

successful completion of studies in the specialty.

To complete the pre-diploma internship, higher education applicants must successfully complete all academic disciplines from the cycle of normative educational components and elective educational components specified in the educational program.

3. Content of academic discipline

The content of the pre-diploma internship and the sequence of its implementation are determined by the program developed by the department in accordance with the curriculum, in line with the educational and professional training of higher education applicants and the specifics of the work of the enterprise where the internship takes place. The internship program is reviewed by the scientific and methodological commission of the Radio Engineering Faculty and approved by the dean of the faculty.

The internship program regulates all activities of higher education students and internship supervisors during the internship period. Guided by the program, the department outlines the requirements for the stages of the internship and the internship work programs, which are developed taking into account the specifics of the enterprise or organization where the internship will take place.

The general educational and methodological guidance of the pre-diploma internship is carried out by the department of the Radio Engineering Faculty through its representative – the internship supervisor from the university. The direct supervision of the students' work during the internship is carried out by supervisors appointed by the enterprise.

The students' internship begins with learning the rules of safety and fire safety. During the internship, safety rules are studied at each workplace.

During the internship, students must comply with the internal rules and working hours of the institution where they are doing their internship. Students are kept on the payroll. Their working day is the same as that of the employees of the service or laboratories where they are doing their internship.

Before leaving for the internship, a general meeting of students is organized with the participation of a department teacher, at which explanations of the main provisions of the internship are given. Each student receives a diary in which they must make weekly entries about the work performed and the material studied. The student's diary is the main document confirming their main work during the internship.

It is important to note the need to keep a diary systematically. Weekly entries allow students not only to consolidate the knowledge they have acquired, but also to identify what needs to be added to the topic the following week (day).

When starting an internship at a given workplace, the student is required to familiarize themselves with the work plan scheduled for the period of their stay at this workplace.

To better prepare for the task, it is worth studying the relevant literature and methodological materials, leading guidelines for the design and operation of instruments and devices, as well as DSTU. The greatest attention should be paid to studying the current rules and regulations.

4. Training materials and resources

Basic literature

1. Law of Ukraine "On Higher Education" dated 01.07.2014 No. 1556-VII [Electronic resource]. – Access mode: http://zakon4.rada.gov.ua/laws/show/1556-18
2. Regulations on the organization of the educational process at Igor Sikorsky KPI. – Access mode: https://osvita.kpi.ua/node/39
3. Regulations on the procedure for conducting internships for higher education students at Igor Sikorsky KPI. – Access mode: https://osvita.kpi.ua/node/184
4. Order of the Ministry of Education of Ukraine dated 12.12.2018 No. 1382 "Standard of higher education in the specialty 172 Telecommunications and Radio Engineering" // https://mon.gov.ua/storage/app/media/vishcha-osvita/zatverdzeni%20standarty/12/21/172-telekom.radiotekhn-bakalavr-VO-zatv.stand.01.11.pdf
5. Professional educational program of the first (bachelor's) level of higher education: Information and Telecommunications Radio Engineering URL: https://osvita.kpi.ua/172_OPPB_IKRI

Additional literature

(optional / introductory)

1. Methodological recommendations on the organization of student internships and the preparation of internship work programs at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" [Text] / Compiled by: N. M. Lapenko, I. L. Spivak, I. V. Fedorenko, O. M. Shapovalova; edited by P. M. Yablonsky. – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2018. – 29 p. – Access mode:https://osvita.kpi.ua/sites/default/files/2019-01/Metod_rekomend_pract.pdf
2. Practical training for bachelor's and master's degree seekers at the Faculty of Radio Engineering: Recommendations for organizing and completing internships [Electronic resource]: textbook for bachelor's/master's degree seekers in the educational programs "Intelligent Technologies of Radio Electronics," "Information and Communication Radio Engineering," "Radio Engineering Computerized Systems," "Radio Electronics Engineering" specialization 172 "Electronic Communications and Radio Engineering" / Igor Sikorsky KPI; compiled by: V. M. Golovnya. – Electronic text data (1 file: 0.6 MB). – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2023. – 39 p. – Access mode: https://ela.kpi.ua/items/e36e9347-21e2-486d-b517-c3e1817bfa63
3. DSTU 3008:2015. Information and documentation. Reports in the field of science and technology. Structure and rules of formatting. National standard of Ukraine. – Official publication. – [effective from 01.07.2017] Kyiv: State Enterprise "UkrNDNC", 2016. – 26 p.

Information resources

1. Information service of Igor Sikorsky KPI https://document.kpi.ua/

Educational content

5. Methods of mastering the academic discipline (educational component)

Responsibility for organizing, conducting, and supervising students' pre-diploma internships rests with the head of the graduating department of RI and the instructor responsible for organizing and conducting pre-diploma internships.

Direct supervision of each student's pre-diploma internship is entrusted to the instructor (supervisor of the thesis/project) and the internship supervisor from the department, who are appointed and approved at a department meeting by the head of the department.

Organizational measures ensuring the preparation and conduct of internships include:

- development of internship programs for higher education students in accordance with educational programs, taking into account the place of internship; appointment of a person responsible for organizing internships for higher education students at the department (Appendix 1);
- determination of internship bases;
- conclusion of agreements on the conduct of internships between the University and the enterprise, organization, institution;
- appointment of immediate supervisors of the internship from the department; development of working programs for the internship;
- compiling topics for individual practical tasks; distributing higher education students among practical training bases;
- issuing internship referrals in accordance with the concluded agreements; familiarization with the rules for filling out the internship diary;
- preparing reporting forms based on the results of the practice (practice log and practice report).

Internship

From the very first days of the internship, higher education students must perform specific engineering tasks at the workplace, performing the duties of an engineer in a design bureau, workshop or factory laboratories, or research institute laboratories.

The work of higher education students at enterprises (institutions) during the internship must correspond to their specialty and include the following main elements:

1. Studying the purpose of tactical and economic requirements, operating conditions, operating principles, and the design of radio equipment manufactured or developed in the enterprise's division.
2. Performing engineering calculations.

3. Manufacturing models of individual radio equipment components and conducting experimental work.
4. Studying the methodology and participating in testing models and serial equipment.
5. Analysis of the technical and economic indicators of the equipment under development and study of methods for calculating the economic efficiency of the designs being implemented.
6. Familiarization with the rules for recording, storing, and issuing documentation.

Final stage

At the end of the internship, higher education students report on the completion of the program and individual assignments. The form of reporting for the internship is a written report (Appendix 2), signed and evaluated directly by the supervisor from the internship base. The written report, together with the internship diary, is submitted for review to the internship supervisor from the University. The report should contain information about the student's completion of all sections of the internship program and individual assignment, conclusions and suggestions, a list of references, etc. The report is prepared in accordance with the requirements specified in the internship program.

The report is defended by higher education applicants before a commission appointed by the head of the department. The commission consists of faculty members who supervise the internship from the department and (if possible) the supervisor from the internship site. The commission accepts the credit for the higher education applicant at the University within the first ten days after the end of the internship.

The result of the internship credit is entered into the credit and examination record and the credit book of the higher education applicant.

No.	Topics of individual assignments (with weekly checks of the calendar plan).	Program learning results	Main tasks	
			Test measure	Deadline of completion
1	Filling out the diary for the first week taking into account additional calculations	PLR 02, 03, 05, 06, 18	Individual consultations	1 week
2	Journal entry for week 2, taking into account additional calculations	PLR 02, 03, 05, 06, 18	Individual consultations	2nd week
3	Filling out the diary for the 3rd week, taking into account additional calculations	PLR 02, 03, 05, 06, 18	Individual consultations	Week 3
4	Filling out the diary for the 4th week with taking into account additional calculations	PLR 02, 03, 05, 06, 18	Individual consultations	4th week
5	Filling out the diary for the 5th week with taking into account additional calculations	PLR 02, 03, 05, 06, 18	Individual consultations	5th week
6	Preparation of a practical report. Submission of the report: • for review by the SPS for additional sections of the report for compliance of calculations with the subject of the DR/DP; • to the DR/DP supervisor for review of the content of the report and its compliance with the requirements for its format.	PLR 06, 08, 13, 14, 18, 24-27	Individual consultations	5 week
7	Receiving feedback on the internship from the internship supervisor and the head of the DR/DP.		Individual consultations	5 week
8	Preparing a presentation for the defense of practical training		Individual consultations	5th week
9	Submission of a package of documents from the internship to the person responsible for the internship at the department (report, diary, conclusion) in paper and electronic form		Individual consultations	5th week

10	Defense of pre-diploma internship by a student before a commission appointed by the head of the department (subject or cycle commission)	PLR 01, 04, 05, 06	Credit	6 week

If a student fails to comply with the approved schedule (without a valid reason), the department may decide to deny the student admission to the defense of the internship and subsequently expel him/her from the university.

6. Independent work by students

The following types of independent work are planned: main and additional sections on the topic of the certification work, preparation and formatting of the report and related documents, preparation for the exam. A total of 180 hours are planned for independent work.

Completing individual assignments is the most important element of practical training for higher education students, as it develops their independence and broadens their technical horizons. Individual assignments are compiled by practical training supervisors from the university and the enterprise and are issued to higher education students during the first days of their practical training.

Individual assignments are related to the chosen topic of the qualification work. Each individual assignment must reflect technical and economic indicators, material on the chosen topic of the thesis project, unique calculations, mock-ups, prototypes, modeling results in accordance with the direction of the work, as well as requirements for occupational health and safety, industrial hygiene, and fire safety.

Materials for individual assignments must be submitted as a separate section/sections of the report. The report must be completed in accordance with the requirements, within the deadline specified by the lecturer and approved by the head of the department.

Aims to develop skills in identifying current issues; additional, in-depth study and practical understanding of individual sections of the curriculum; development of skills for independent work with scientific literature.

The main purpose of the report is to solve a practical problem using theoretical material and practical skills acquired during the bachelor's degree program.

Policy and control

7. Academic discipline policy (educational component)

University students undergoing practical training are required to:

- obtain a referral from the internship supervisor at the university, methodological materials (methodological guidelines, program, diary, individual assignment), and advice on completing all necessary documents before the start of the internship;
- arrive at the internship site on time;
- fully complete all tasks specified in the internship work program and instructions from its supervisors;
- study and strictly adhere to the rules of labor protection, safety, industrial hygiene, and internal regulations;
- be responsible for the work performed;
- complete the reporting documentation in a timely manner and pass the internship exam.

Academic integrity

The policy and principles of academic integrity are defined in Section 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute." For more details, please visit: https://kpi.ua/code.

Standards of ethical conduct

The standards of ethical conduct for students and employees are defined in Section 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute." For more details, please visit: https://kpi.ua/code.

Procedure for appealing the results of control measures

Students have the opportunity to raise any issue related to the assessment procedure and expect it to be considered in accordance with predefined procedures.

Students have the right to appeal the results of an assessment in accordance with the approved regulations on appeals at Igor Sikorsky Kyiv Polytechnic Institute (approved by order No. NON/128/2021 dated May 20, 2021) - https://osvita.kpi.ua/index.php/node/182

Inclusive education

The acquisition of knowledge and skills in the course of studying the discipline "Pre-diploma practice" may be accessible to most individuals with special educational needs, except for applicants with severe visual impairments that prevent them from performing tasks using personal computers, laptops, and/or other technical means.

Distance learning

Control measures can be carried out during students' independent work in a distance learning mode (with the possibility of consulting with the teacher via email, social networks, messengers, and video conferencing tools).

Teaching in Ukrainian

Education in English is available only to foreign students. When completing assignments, students may be advised to refer to English-language sources.

8. Types of control and rating system for assessing learning outcomes (RSA)

Admission to the defense (credit) of pre-diploma practice requires the mandatory availability of reporting documents with all necessary signatures and seals.

To present the results of the practice, the higher education applicant prepares a presentation and a report. Based on the quality and content of the report, diary, feedback from the practice supervisor, and the results of the higher education applicant's answers to questions, the commission members give a grade for the practice defense.

The rating of a higher education applicant based on pre-diploma practice consists of points that he or she receives:

- for completing the journal - 10 points;
- for completing the report - 40 points;
- for presenting and defending the report on pre-diploma practice - 30 points.

Assessment system (ongoing assessment):

No. No	*Assessment control measure*	*%*	*Weight*	*Number*	*Total*
	Starting component				
1	Assessment by the internship supervisor from the internship base / supervisor of the applicant's research work during the internship	20	20	1	20
	Defense component				
2	Written report assessment	40	40	1	40
3	Keeping a practice diary (weekly reports)	10	2	5	10
4	Presentation of internship results during report defense	10	10	1	10
5	Report defense (evaluation of answers to questions from members of the semester control commission)	20	20	1	20
	Total				100

Assessment is carried out in accordance with the Regulations on the system of assessment of learning outcomes at Igor Sikorsky KPI (Approved and put into effect by Order No. 1/273 of 14.09.2020). https://osvita.kpi.ua/sites/default/files/downloads/Pologennia_RSA_2022.pdf

Journal design (maximum 10 points):

Correctly completed diary (all fields filled in, necessary marks, stamps, signatures, and feedback from the company manager present)	9-10 points
The logbook is filled out with some errors (required fields are not filled out)	6-8 points
Unformatted diary (no entries, no feedback from the company manager, no company stamps)	Not eligible for credit

Report formatting (maximum 40 points):

Highest quality report formatting, requirements: 1. complete and comprehensive presentation of the material used during the higher education student's internship and during the preparation of the relevant section; 2. a complete set of necessary attachments, calculations, layouts required by the relevant section of the practice (copies of documents, analytical and statistical materials, etc.); 3. relevance and reliability of the information presented in the report; 4. compliance with the requirements, in accordance with the standards, regarding the content and design of the structural parts of the practice program.	38-40 points
Mediocre quality of the report: 1. incomplete presentation of material or incomplete compliance of the content of the work with the requirements of the internship program and individual assignment (50-75% coverage of the issues specified in the internship program for the relevant discipline); 2. incomplete set of materials required by the relevant section of the practice (50-75% of the required content); 3. irrelevance or obsolescence of the information presented in the report; 4. non-compliance with the requirements for the content and format of the structural parts of the internship program.	24-37 points
Unsatisfactory quality of the section of the report: 1. Incomplete presentation of material or incomplete compliance of the content of the work with the requirements of the internship program (less than 50% coverage of the issues specified in the internship program for the relevant discipline); 2. incomplete content of materials required by the relevant section of the internship (less than 50% of the required materials); 3. inaccuracy of the information presented in the report.	<24 points

When evaluating the internship report as a whole, the commission may additionally reduce the score for any shortcomings and errors, which are considered to be:

- untidy presentation of the work (use of non-standard abbreviations, handwritten version of the report, illegible handwriting, use of pencils instead of clear ink) (minus 6 points);
- errors in the formatting of the internship report compared to the current requirements (minus 5 points); incorrect statistical and analytical data, if the error is insignificant and does not affect the conclusions made in the report (minus 3 points):
- use of outdated scientific and information sources

Defense of the pre-diploma internship report (maximum 20 points)

Highest quality defense of the internship report: 1. free command of the content of the work carried out during the internship, a clear understanding of the essence of the chosen scientific problem and mastery of the achievements of science and practice in this field; 2. complete knowledge of the relevant material and publications on the chosen topic;	18-20 points
1. poor command of the content of the work carried out during the internship, clear understanding of the essence of the chosen scientific problem and mastery of scientific and practical achievements in this field; 2. incomplete knowledge of the relevant material and publications on the chosen topic; 3. when revealing the content of the question, significant errors were made in	15-17 points

determining the term of acceptance or the name of the instructional material, which was generally correct according to the specified requirements	
1. with regard to the answer with the highest score, two or more points specified in the requirements for it are not disclosed; 2. both types of shortcomings are present, which separately characterize the assessment criterion of 18-20 points; 3. The nature of the answers gives reason to believe that the person defending the internship report has misunderstood the content of the internship and therefore does not answer the questions on the merits, making gross errors in the content of the answer.	12-14 points

Calendar control (CC) – not provided.

Semester assessment of students

	Mandatory condition for admission to the defense of the	***Criterion***
1	Availability of supporting documents (diary, report, presentation)	**≥ 20 points**
2	Positive assessment of the report (starting points)	**> 35 points**

When completing the internship assessment, the total number of points is influenced by the work discipline of the higher education applicant during the internship.

In case of violation of the schedule and content of the internship (recorded in the relevant journal), the commission may lower the grade:

- for a single violation of the individual internship schedule and absence without valid reasons at the internship site at the appointed time or systematic tardiness (minus 2 points for each violation);
- for late submission of the internship report to the department (minus 10 points).

A student who has not completed the internship program, received an unsatisfactory review at the internship site, or received an unsatisfactory grade during the defense of the report will be expelled from the University.

The results are announced to each student individually in person at the assessment event or remotely (by email, in the Sikorsky distance learning system). They are also recorded in the Electronic Campus system.

Optional conditions for admission to the exam: none.

Table of correspondence between rating points and university scale grades:

Number of	Grade
100-95	Excellent
94	Very good
84	Good
74-65	Satisfactory
64-60	Sufficient
Less than	Unsatisfactory
Conditions for admission not met	Not admitted

The assessment is conducted in accordance with the "Regulations on the procedure for conducting practical training for higher education students at Igor Sikorsky KPI" and the "Regulations on the system for assessing learning outcomes at Igor Sikorsky KPI."

9. Additional information on the discipline (educational component)

Organization of remote internships.

1. Practical training, which involves training at enterprises, institutions, or organizations, may be conducted remotely or directly at the premises of the enterprise, institution, or organization at the request of an adult applicant, provided that the training base is located as close as possible to their place of residence.
2. The decision on the form of all types of internships is made by the graduating department.

During training and for interaction with students, modern information and communication and network technologies are used to solve educational tasks.

Work program for the academic discipline (syllabus):
Compiled by:

Associate Professor of the Radio Engineering Department,
Ph.D., Associate Professor Guseva O.V.,
Associate Professor of the Radio Engineering Department,
Candidate of Technical Sciences, Associate Professor Litvintsev S.M.

*App**roved by** the RED (Minutes No. 06/2024 dated 06/26/2024)*
***Approved by** the REF Methodological Commission (Minutes No. 06-2024 dated 28.06.2024)*

Appendix 1. Structure of the practical training program and content of its sections

UKRAINE
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
“IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE"

03056, Kyiv, Peremohy Ave., 37; tel.

Faculty (institute)_____

"Approved"
Dean of the faculty (director of the institute)
_____
"___" _____20__
Seal

AGREED:

Chief Specialist of the Enterprise:
_____
“___”_____ 20__

Head of Department:
_____
“___”_____20 _

WORKING PROGRAM

for conducting _____practical training for students of the _____course
(name of internship)
in the specialty_____
_____
at the enterprise_____
from "____"_____ to "____"_____20__

The work program is based on the program approved by the dean of the faculty
"____"_____20__.

1. Introduction: (Briefly outlines important issues related to the organization and conduct of the internship: the basic rights and responsibilities of students and internship supervisors from the university and the enterprise, implementation of the program in the specialty, compliance with safety rules and regulations at the enterprise, etc.)

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2. Purpose and objectives of the internship (based on the program, taking into account the specifics of the internship sites):

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3. Organization of practical training

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4. Internship content (taught in accordance with the program to ensure the completion of tasks and achievement of internship goals; a list of recommended literature and textbooks is provided).

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5. Calendar plan for the internship:

No.	Content	Deadline
1	Student arrival for internship, registration, and receipt of passes	
2	Conducting safety and occupational health training	
3	Conducting tours of the enterprise, familiarization with the workplace	
4	Completion of the internship program and individual assignment (with weekly checks)	Throughout the entire internship
5	Completion of a journal, report, and practical training assessment	

6. Requirements for the report

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7. Forms and methods of control

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8. Assessment criteria

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9. Recommended reading

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_____

Practical training supervisor from Igor Sikorsky Kyiv Polytechnic Institute

_____
(position, surname, signature)

Practical training supervisor from the enterprise

_____
(position, surname, signature)

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The development of a work program for the internship is a responsible creative process for the university's teaching staff, which should not be limited by frameworks and schemes. In general, the work program for the internship may consist of the following sections and subsections:

- Introduction.
- Purpose and objectives of the internship.
- Organization of the internship.
- Content of the internship (individual assignment or individual work plan; training and excursions during the internship).
- Calendar plan.
- Requirements for the report.
- Forms and methods of control.
- Assessment criteria.
- Recommended reading.

Depending on the specifics of student training and the characteristics of the training bases, or for other valid reasons, certain sections may be omitted or included in the program.

1. The "Introduction" should specify the course, specialty/specialization (code and name), duration, internship period, internship base, main responsibilities of students and internship supervisors from the university, and other general issues.

2. The section "Goals and objectives of the internship" is one of the main sections of the work program, which determines the focus of the activities of students and teachers during the internship. The objectives of the internship are practical activities in the field of the future profession, preparation of students for final exams, and collection of materials for certification work.

The formulation of the goals and objectives of the internship in the work program should be based on a substantive analysis of the disciplines in the curriculum and correspond to the list of competencies, knowledge, skills, and abilities that students should master during the internship. Clearly and reasonably defined goals and objectives of the internship make it easy to monitor the progress of the program and make necessary changes.

3. The section "Organization of the internship" should specify the internship base, the main responsibilities of students and internship supervisors from the university and the internship base, and other organizational issues.

This section should indicate the need for students to strictly comply with the occupational health and safety and fire safety rules adopted at the practice base, with mandatory training (introductory and at each specific workplace).

If students are involved in assisting the internship site during the internship, this should be noted in the internship work program, specifying the maximum possible duration of such work, as well as the mandatory nature of additional safety training.

The internship supervisor from the university determines the time allocated for summarizing the internship materials and preparing the final report, as well as the deadline for submitting the internship report.

4. The main part of the internship work program is the section "Internship Content." Here, it is necessary to describe in detail and specifically all the necessary measures to achieve the set goals and solve the tasks of the internship for students of a particular specialty and a certain stage of training. Based on the characteristics and capabilities of the internship bases, it is advisable to form an indicative list of places (positions) where students can undergo an internship. In this section, it is advisable to provide a calendar plan for the internship.

During the internship, students acquire new knowledge and skills, mainly by performing specific practical tasks, so it is most appropriate for students to work in full-time positions.

The section "Individual tasks" or "Individual work plan" is included in the work program in order for students to acquire the skills of independently solving production, scientific, or organizational tasks during the internship. Completing individual tasks stimulates students' activity, broadens their worldview, increases their initiative, and makes the internship more specific and purposeful. The content of individual tasks should correspond to both the objectives of the educational process and the needs of production, taking into account the capabilities and proposals of the internship base. In the case of pre-diploma (research) internships, the content of the individual assignment is agreed upon with the topic of the diploma project (thesis) or master's dissertation.

The individual assignment is developed by the internship supervisor from the department and given to each student. The individual assignment should correspond to the level of theoretical and practical training of students. The materials obtained by the student during the performance of the individual assignment may be further used for the performance of the certification work, for the preparation of a report, article, or for other purposes as agreed with the department and the practice base.

The section "Training and excursions during the internship" provides an approximate list of topics for these events. Their planning and implementation is carried out jointly with the internship supervisors from the university and the internship base. Training during the internship can be conducted in the form of lectures, seminars, practical and laboratory work, which will contribute to the deepening of theoretical training using the material resources of the internship base. Lectures and seminars should reveal to students the prospects for the development of the specialty and prepare them for studying the disciplines of the curriculum. The most qualified scientists and employees of the practice base should be involved in conducting such classes.

Excursions during the internship are conducted with the aim of providing students with the most complete understanding of the structure of the internship base, the interaction of its individual departments, and the current management system. To broaden students' worldview and erudition, it is advisable to conduct excursions not only at the base where they are undergoing practical training, but also at other enterprises, organizations, and institutions in related and adjacent industries.

5. The "Calendar Plan" section briefly outlines the stages of work that the student must complete during the internship and clearly indicates the deadlines for completing this work.

6. The section "Report Requirements" should contain information about the scope of the report, the presence of main sections in it, the sequence of presentation of the material, and the rules for formatting. The reports should briefly and specifically describe the work personally performed by the student. The reports should not contain verbatim rewrites of internship materials (history of the base, technical descriptions, etc.), as well as quotations from literary sources. The forms of reporting documents are approved by the relevant department and should be included in the appendices to the methodological materials provided to students.

In order to summarize the materials collected during the internship and the preparation of the report, students are given a certain period of time at the end of the internship, which must be specified in the work program. The report is checked and approved by the internship supervisors from the internship base and the university. Student reports are kept at the department for three years, then written off and disposed of in accordance with the established procedure.

7. The section "Forms and methods of control" of the work program covers all issues related to the control of student activities by internship supervisors from the university and the internship base. The list of reporting documentation is specified in the work programs for the internship. In particular, this includes a daily internship log, reports on the completion of individual tasks and the internship program as a whole, documents certifying the performance of various types of professional activities (e.g., experiment reports, etc.), and character references signed by internship supervisors from the internship site and the university and certified by the enterprises.

8. The section of the work program entitled "Assessment Criteria" states that the results of the internship are summarized in the process of the student taking a test, which is accepted by a commission appointed by the head of the department. The internship grade is taken into account along with other grades that characterize the student's academic performance. When calculating the final grade, all types of student activities specified by the teacher for assessment are taken into account.

The results of the practical training exams are entered into the exam record, recorded in the exam book, and entered into the academic record.

A student who has not completed the practical training program without valid reasons may be given the right to repeat the practical training if the conditions specified by the university are met. A student who receives an unsatisfactory grade for practical training on the second retake of the exam by the commission is expelled from the university.

9. The "Recommended Reading" section of the program should contain a list of literature that students need to study in order to complete the internship program. This should mainly be literature that is not available at the university but is available at the internship site: regulatory materials, descriptions, visual aids, etc. The list of textbooks should be minimal in terms of nomenclature and volume, necessary and realistically take into account the time that students can allocate for their study during the internship.

Appendix 2. Internship report and requirements for it

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
"IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE"

Radio Engineering Faculty

Department _____

REPORT

FROM _____PRACTICAL TRAINING
Practical training title

Performed by:

Student of __ course, group _____

_____ _____
(Last name, first name) Signature

Report accepted by:

_____ _____
(Surname, first name of the internship supervisor from the enterprise/scientific supervisor) Signature

"____" _____ 20__

_____ _____
(Surname, initials of the internship supervisor from the department) Signature

"____" _____ 20__

Kyiv – 20___

REQUIREMENTS FOR THE REPORT

The internship report is compiled based on the results of the internship program and should be 5–15 pages long (excluding appendices). The report should reflect the goals and objectives of the thesis project (work) and provide an analytical description of the collected material.

The report must reflect all stages of the internship program.

The report must be written on A4 paper and have a title page indicating the name of the university, department, group, student's surname, as well as the position and surname of the scientific supervisor and internship supervisor. The title page must be formatted according to the established standard form. The title page must bear the student's personal signature. The report must be formatted in accordance with DSTU 3008:2015 Reports in the field of science and technology.

Structure and formatting rules

The left margin of the page must be at least 25 mm, the right margin at least 10 mm, and the top and bottom margins at least 20 mm. The text is typed on a computer using Times New Roman font, size 14, with one and a half line spacing.

For ease of reading, the titles of sections and subsections should be highlighted in bold (INTRODUCTION, SECTIONS, CONCLUSIONS, LIST OF REFERENCES).

Each section should start on a new page. Appendices are labeled consecutively with capital letters of the Ukrainian alphabet, starting with A (for example, APPENDIX A). The thematic title of the appendix should be located below (in capital letters).

The materials of the report are bound in a binder (or stapled) in the order specified above, starting with the title page. Reports that are not neatly formatted will not be accepted for review.

The content of the second section of the report should correspond in its main provisions to the topic of the certification work being prepared by the student.

The report should include:

Title page	- 1 page
Introduction	- 1-2 pages
Main part (3 sections)	- 10-15 pages
Section 1. Analysis of the current state of the research object.	
Section 2. Research methodology.	
Section 3. Selection and justification of research tools and methods, their evaluation.	
Conclusions	- 1–2 pages
List of references	- 1-2 pages

Other elements of the report (communication organization diagrams, structural and schematic diagrams of terminal equipment, etc.) shall be formatted in accordance with the requirements of the unified design documentation system.

All graphic materials in the report (sketches, diagrams, graphs, charts, photographs, drawings, blueprints, etc.) must have the same caption "Figure" and be numbered consecutively with Arabic numerals within the section, with the exception of illustrations given in the appendix. The figure is presented immediately after the text where it is first referenced, or as close as possible to it on the next page, and, if necessary, in the appendices to the report.

The figure number (except for tables) should consist of the section number and the sequential number of the illustration, separated by a period, for example: Figure 3.2 — Figure title (second figure of the third section).

Numerical data should be presented in tables. Each table should have a number and a thematic title. The table should be placed after the first mention of it in the text.

Formulas in the report are numbered with Arabic numerals.

In addition to the descriptive part, the report should contain graphic material, for example: sketches, diagrams. The report should be technically competent, and the material should be presented in a concrete and concise manner. The sketches included in the report should be drawn to scale, indicating the most

characteristic dimensions. Each sketch or diagram should be numbered and have an accurate and complete name of the objects depicted.

The bound report is signed by the scientific supervisor and the internship supervisor from the department.

The defense of the internship report takes place before a commission appointed by the department. Based on the results of the defense, the student is given a grade.

Students who have not completed the internship program, violated the deadlines for defense, or received an unsatisfactory grade during the defense of the pre-diploma internship report are expelled from Igor Sikorsky KPI as having failed to complete the curriculum and having academic debt.