

SYLLABUS

**INTERNATIONAL EUROPEAN
UNIVERSITY**



**EUROPEAN SCHOOL
OF BUSINESS**

**Fundamentals of software engineering
Educational program «Software engineering»
«Information systems and technologies»**

2024



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1	Name of the course and educational program
	Fundamentals of software engineering Educational program "Software engineering", "Information systems and technologies"
2	Course description
	In modern conditions, attention in the processes of program development is shifting from the actual coding of programs to other processes of their development, from qualitative aspects to quantitative, engineering ones. Software engineering is the basis of the organization of the program development process, methods and means of justifying the parameters of the software project, which characterize the financing, terms, volumes of the software, and the composition of the team of developers. Additional attention is directed to the management of software projects. To acquaint students with the basic principles and concepts of software engineering; develop the ability to analyze, design and implement software; learn the main methods and tools used in software engineering; to prepare students for further study of specialized courses in programming and software development.
3	Study prerequisites
	The educational discipline is an introduction to the specialty and the basis for studying many disciplines for further education.
4	Amount of credits/hours
	4 ECTS credits/ 120 hours
5	Training format
	Blended learning
6	Classroom location
	Audience 405. https://dist.ieu.edu.ua/course/view.php?id=601
7	Information about the teacher
	Oleksandr Nesterenko , doctor of technical sciences, professor
8	Department
	Department of Information Technologies
	
9	Office location
	Kyiv, Akademika Glushkova Ave., 42 B, room 505



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10 Schedule of counseling

Every Monday from 12:00 to 16:00 with prior appointment via corporate mail

11 E-mail of the teacher

oleksandr_nesterenko@ieu.edu.ua

12 Course objectives

Students acquire knowledge about the principles and processes of developing software products and software systems, modern methodologies and practices in software development, acquisition of skills and practical skills in using the main means of organizing the software development process.

13 The role of academic discipline in achieving program results

Specialty 121 "Software Engineering"

PR01. Analyze, purposefully search for and select the information and reference resources and knowledge necessary for solving professional tasks, taking into account modern achievements of science and technology.

PR02. Know the code of professional ethics, understand the social significance and cultural aspects of software engineering and adhere to them in professional activities.

PR03. Know the main processes, phases and iterations of the software life cycle.

PR04. Know and apply professional standards and other regulatory documents in the field of software engineering.

PR06. The ability to choose and use a software development methodology appropriate to the task.

PR16. Have skills in team development, approval, design and release of all types of software documentation.

PR22. Know and be able to apply project management methods and tools.

Specialty 126 "Information systems and technologies"

PR03. Know the main processes, phases and iterations of the life cycle of information systems.

PR04. Know and apply professional standards, international recommendations and other regulatory documents in the field of creating management information systems.

PR06. The ability to choose and use the appropriate methodology for creating information systems.

PR16. Have team development skills.

PR17. Be able to apply the methods of component development of information systems software.

PR18. Know and be able to apply information technologies for data processing, storage and transmission to support management and decision-making processes.

PR21. Be able to ensure the approval, design and release of all types of technical documentation and present the results of the development of information systems.

14 Learning outcomes

Know:

- concepts of software engineering;
- peculiarities of creating software products and systems;
- main stages of development of software products and systems;
- basic software development methodologies and their application;
- modern practices used in the software development process;

Be able:

- rationally determine and substantiate the necessary software development methodology and life cycle model depending on its properties and the characteristics of the development team;
- create a detailed functional specification of the software product based on the requirements provided by the customer;
- develop software development project plans.



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Course content

CONTENT SECTION 1. DEFINITION OF SOFTWARE ENGINEERING

Topic 1.1. General definition of software engineering.

Topic 1.2. Areas of SWEBOK knowledge.

Topic 1.3. Life cycle standards and models.

CONTENT SECTION 2. REQUIREMENTS FOR SOFTWARE SYSTEMS

Topic 2.1. Requirements engineering.

Topic 2.2. Modeling and designing the architecture of software systems.

Topic 2.3. Programming methods.

CONTENT SECTION 3. SOFTWARE PRODUCTION ENGINEERING

Topic 3.1. Production engineering.

Topic 3.2. Methods of proof, verification and testing programs

Topic 3.3. Quality and reliability models of software systems.

Topic 3.4. Software project management.

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Course Books and materials

1. Lavrishcheva K.M. Software engineering. Kyiv, 2008. 319 p.
2. Borodkina I.L., Borodkin G.O. Software engineering. Education manual. NUBiP Kyiv: Center for Education. literature 2020. 204 p.
3. Pfleeger SL Software Engineering. Theory and practice. Printice Hall: Upper Saddenle River, New Jersey, 1998. 576 p.
4. Ian Sommerville. Software engineering. 6th edition. M.; St. Petersburg Kyiv, 2002. 623 p.
5. Brooks F.P. The mythical man-moon or how software systems are created. Translated from English St. Petersburg: Symbol-Plus, 2005. 304 p.
6. Principles of quality engineering of program systems / F.I.Andon, G.I.Koval, T.M. Korotun, E.M. Lavrishcheva, V.Yu. Suslov Kyiv: Akademperiodika. 2007. 678 p .
7. Jacobson I. Object-Oriented Software Engineering. A use Case Driven Approach, Revised Printing. New York: Addison-Wesley Publ. Co., 1994. 529 p.
8. David C. Evans “Bottlenecks: Aligning UX Design with User Psychology”
9. Jon Yablonski “Laws of UX: Using Psychology to Design Better Products & Services”
10. Nir Eyal “Hooked. How to Build Habit-Forming Products”

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Technical requirements for working on the course

To work on the Fundamentals of Software Engineering course, you need regular access to a computer and the Internet.

In order to successfully study and pass the exam from the training course, you need to constantly familiarize yourself with the materials posted on the university's remote platform (Moodle) in the Human-Machine Interaction course. You also need to create reporting documents for the performance of laboratory work and upload them to the platform. You can use the remote platform only from your corporate mail account.

If it is impossible to access the platform or the course, you must notify the dean's office or the headmaster, or the course instructor directly.



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Learning process

The process of studying the course "Fundamentals of Software Engineering" includes lectures and laboratory sessions.

During the lectures, such teaching methods as lecture, lecture-conversation, discussion, discussion of problematic issues, demonstration, and analysis of various situations will be used according to the topic of the lectures.

During laboratory classes, such teaching methods as surveys, testing, performance of individual tasks, performance of analytical and calculation works, solved specific problems and situations will be used).



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Signs of discipline

Term of teaching	Semester	International Disciplinary integration	Course study	Cycles: general training/ professional training/ free choice
1 semester	2nd semester	No	1st course	Cycle of professional training

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Evaluation policies

You will have different ways to demonstrate your knowledge and skills throughout the semester. This includes how you attend class, how and what you contribute to topic discussions, how you complete and complete lab assignments and tests on time, how you complete independent work assignments, and the ability to present your work. In addition, it is possible to perform tasks that are performed individually or in a small group in the form of a student scientific work.

Activities during the semester	Maximum number of points during the semester
Current work (attendance, monitoring of lectures, Performing laboratory work)	8
Tests (8)	16
Performance of laboratory work (assessment according to the internship certificate)	60
Performance of independent work	6
Total current work Credit	90
Test	10
TOTAL	100



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Rating scale

The grade for the discipline is defined as the sum of the points scored for the current activity in the semester. Each module includes an assessment score for the student's current work. Module control activities are carried out upon completion of the study of the taught material of this module. The minimum number of points for the current educational activity, which allows the discipline to be counted as completed, must be at least 60. The maximum point for the discipline is 100.

The total grade for studying the discipline is set according to the national and European scale (EKTS).

The overall final grade in points, according to the national scale and according to the ECTS scale, is entered in the student's assessment and examination information, study card and student's assessment book.

Rating scale: national and ECTS

The sum of points for all types of educational activities	Evaluation on ECTS	Evaluation on a national scale	
		for an exam, course project (work), practice	for credit
90-100	A	perfectly	Enrolled
82-89	B	good	
74-81	C		
66-73	D	satisfactorily	
60-65	E		
30-59	FX	unsatisfactory with possibility reassembly	not counted with the possibility of retaking
1-29	F	unsatisfactory with mandatory repeated study of the discipline	not enrolled with mandatory repeated study of the discipline



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How to find out your score

To check your assignment grades and read the teacher's comments, you need to check the relevant tabs on the distance learning platform (Moodle) in this course.

You can also get information about the received grades in the joint chat of the subject group (Viber or Telegram) or directly from the course instructor via corporate mail, messengers or by appointment on the days of consultations.



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Course policies

For the productive educational and cognitive activity of the applicants when studying the discipline, thematic lectures are held and practical classes are conducted in the form of laboratory works.

In classes and during his stay at the university, the student must treat teachers, staff and other students with respect, attend classes according to the schedule, come on time and not leave the classroom without the teacher's permission. It is necessary to complete all academic tasks and their work within the specified time.

The teacher, in turn, must constantly raise his professional level, pedagogical skill, general culture, provide conditions for students to master educational programs at the level of mandatory requirements for the content, level and scope of education, promote comprehensive professional development of students. It is mandatory to follow the educational and thematic plan, not to be late for classes, not to allow any manifestations of corruption, discrimination, bullying, harassment and oppression of the rights of those seeking education.

Education is based on the application of active learning methods. Active participation is expected and the norm. Attendance and active participation make up 80% of the grade. A student who, for good reasons, documented, was not subject to current control has the right to undergo current control within a two-week period after returning to studies.

A student who was absent from classes without valid reasons, did not participate in current control activities, did not liquidate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam in the examination information by a scientific and pedagogical employee the grade "not admitted" is issued. Retaking the exam in the discipline is prescribed on the condition that all types of educational, independent (individual) work provided for in the work curriculum of the discipline are performed, and is carried out in accordance with the liquidation schedule approved by the directorate.

The academic integrity of any institution of higher education requires integrity in teaching and research, so academic integrity is required of all MEU students. Academic dishonesty is prohibited in all programs at our university. All participants in the educational process are guided by the principles of academic integrity.



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Completing the task late, correcting grades, working out

Assignment reports must be uploaded to Moodle by the due dates specified in the course schedule. Best practice would be to complete assignments as soon as possible after receipt to allow enough time to actively participate in class. If more time is needed to complete the task, flexible deadlines are available. Completed assignments are accepted for full credit until the last class in the discipline on the schedule, after which 40% partial credit based on the grade received will be awarded within a week of the last day of class. Assignments that were not submitted at all will receive 0.

If classes are missed for more than one week due to illness or other reasons, it is necessary to contact the teacher to agree on alternative options for completing tasks. Deadlines work both ways, and meeting them ensures that your instructor provides timely feedback on your assignments to ensure you stay on course.





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25 Teacher's response time (about checking assignments)

Via corporate mail (within 24 hours), via messengers (within 1-2 hours).

26 Effective communication

Effective communication is essential to success in this course, we recommend using the following channels:

Forum of questions and answers: for general course questions, you need to check the FAQ section in Moodle and then post your question in the Q&A forum to ask your colleagues or the instructor (guaranteed to receive a notification by e-mail every time a new publication or an answer to a question appears);

E-mail: have a personal question related to studying the course, write to the teacher directly;

Social networks, messengers: personal communication with classmates, teacher;

Face-to-face meeting: communication with classmates during classes and with the teacher on consultation days.

27 Policy of publication and distribution of course materials

Students may not post, publish, sell, or otherwise publicly distribute course materials without written Permission the teacher. Such materials include: lecture notes, slides (presentations) of lectures, video or audio recordings, tasks, problem sets, tests, other students' works and answers, etc. Students who sell, post, publish, or distribute course materials without written permission or otherwise may be subject to disciplinary action, up to and including withdrawal.

The use of generative AI is permitted subject to adherence to the principles of academic integrity.

28 Expected workload and involvement of students

Approximately 2-3 hours per week should be allocated to work in this course. If circumstances arise that force you to spend more time on one of the tasks, you must inform the teacher by e-mail (messenger).

An extension of the submission deadline is possible only under the condition that the teacher is informed in advance that it is impossible to submit the assignment by the specified time. Students are expected to have a backup plan in case of computer malfunctions or Internet outages.

29 Support services

Electronic schedule: <https://rozklad.ieu.edu.ua>

Online library: <https://onlinelibrary.ieu.edu.ua>

Repository: <https://sed.ieu.edu.ua/index.php/sed/index>

Educational Ombudsman: <https://ieu.edu.ua/pro-mieu/ombudsmen>



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Course schedule

Topic name	Content of practical class
<p>Topic 1. 1. GENERAL DEFINITION OF SOFTWARE ENGINEERING. The role of software engineering in software development. Software engineering as an engineering and scientific discipline. The software development process. Introduction to the basic concepts and terminology of software engineering. Basic international recommendations on software engineering. Topic 1.2. SWEBOK KNOWLEDGE AREAS. Characteristics of software engineering knowledge areas</p>	<ol style="list-style-type: none"> 1. Oral survey 2. <u>Laboratory work 1</u> - Introduction to product IT 3. Questions for independent study - Essay on the historical development of programming 4. Tests
<p>Topic 1.3. LIFE CYCLE STANDARDS AND MODELS. Life cycle characteristics according to ISO/IEC 12207</p>	<ol style="list-style-type: none"> 1. Control on lectures 2. <u>Laboratory work 2</u> – Principles of creating and developing IT products; 3. <u>Questions submitted for independent study</u> - Read the materials of the recommendations SE2004 and SS2020. 4. Tests
<p>Topic 2.1. REQUIREMENTS ENGINEERING. Definition and analysis of software requirements. Classification of requirements. Topic 2.2. MODELING AND DESIGN OF SOFTWARE SYSTEMS ARCHITECTURE. Principles and methods of software design. Modeling of systems and software components</p>	<ol style="list-style-type: none"> 1. Control on lectures 2. <u>Laboratory work 3</u> - Idea Search and MVP Development 3. <u>Questions submitted for independent study</u> - Method b of building an object model of the subject area systems. 4. Tests
<p>Topic 2.3. PROGRAMMING METHODS. Applied (systematic) programming (structural method; object-oriented; component; service-oriented; aspect-oriented, etc.).</p>	<ol style="list-style-type: none"> 1. Control on lectures 2. <u>Laboratory work 4</u> - Decision-making in the creation of IT products 3. <u>Questions submitted for independent study</u> - Theoretical programming. 4. Tests
<p>Topic 3.1. PRODUCTION ENGINEERING. Engineering of reusable components. Applied engineering and subject area engineering.</p>	<ol style="list-style-type: none"> 1. Control on lectures 2. <u>Laboratory work 5</u> - Joint work on a product project. The Lean Canvas model 3. <u>Questions submitted for independent study</u> - Describe the existing product in the chosen field according to the Lean Canvas mode. 4. Tests
<p>Topic 3. 2. PROOF, VERIFICATION AND PROGRAM TESTING METHODS. Program specification languages and their classification. Methods of proving the correctness of programs. Verification and validation of programs</p>	<ol style="list-style-type: none"> 1. Control on lectures 2. <u>Laboratory work 6</u> - Search for a product idea and a software solution 3. <u>Questions submitted for independent study</u> - Preparation of a plan to launch one's own product 4. Tests



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Topic 3.3. QUALITY AND RELIABILITY MODELS OF SOFTWARE SYSTEMS. Quality model of software systems. Standard quality indicators and quality metrics. Basic concepts of reliability issues	<ol style="list-style-type: none">1. Control on lectures2. <u>Laboratory work 7</u> - Analysis of consumer behavior3. <u>Questions submitted for independent study</u> - Analysis of any interesting application for the presence of UX design laws and principles in it.4. Tests
Topic 3.4. SOFTWARE PROJECT MANAGEMENT. Project management. PMBOK. Branches of project management knowledge	<ol style="list-style-type: none">1. Control on lectures2. <u>Laboratory work 8</u> - Creation of startup pitch decks to attract investors3. <u>Questions submitted for independent study</u> - Preparation of the presentation of your pitch deck according to the defined structure.4. Tests

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Tips for successful study

The goal is unique to everyone, but its correct setting greatly affects the result, as well as the learning process. For example,

- processing the materials of the theoretical component (lectures) of the discipline will provide insight and knowledge about the
- development process and the architecture of the OS itself, and the implementation of the practical component - the acquisition
- of practical skills in the use of methods and tools for creating system software. After all, any training that follows a clear plan and
- with a serious attitude to the material will always be successful.

So, if you want to successfully master this subject, you must be:

- persistent, attentive and inquisitive;
- creative and cheerful, open to communication and discussions
- ready to receive information and knowledge on the subject not only during lectures, but also during extracurricular hours

See you soon!