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INTERNATIONAL EUROPEAN UNIVERSITY

BUSINESS ARS EST

EUROPEAN SCHOOL OF BUSINESS

Software Construction
Software Engineering EPP

2024

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1	Course title and educational program

Software Construction
Software Engineering EP

2	Course description

The subject matter of the Software Construction academic discipline is modern and efficient principles of detailed software construction, formal methods and approaches to describing the software construction process, as well as the corresponding software tools.

3	Prerequisites for study

The academic discipline is related to such disciplines as Software Architecture and Design, Analysis of Software Requirements, Data Algorithms and Structures, Object-Oriented Programming, and Fundamentals of Software Engineering.

4	Number of credits/hours

4 ECTS credits / 120 academic hours

5	Mode of study

Blended learning

6	Classroom location

Classroom 405. https://dist.ieu.edu.ua/enrol/index.php?id=574

7	Lecturer's full name

Oleksandr Falovskyi, PhD in Technical Sciences, Associate Professor at the Department of Information Technology

8	Department

Department of Information Technology

9	Office location

42V Akademika Hlushkova Ave., Kyiv, room 505

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10	Consulting

Every Tuesday from 2 p.m. to 3:30 p.m. by appointment via corporate e-mail

11	Lecturer's e-mail address

oleksandr_falovskyi@ieu.edu.ua

12	Course objectives

The goal of the Software Construction academic discipline is to provide students with a solid theoretical foundation, knowledge of fundamental methodical principles and software tools used by software developers. It aims to ensure theoretical and engineering training for specialists in designing and developing information systems.

13	The role of the academic discipline in achieving program learning outcomes

PLO 4. To know and apply professional standards and other regulatory documents in the software engineering sector.
PLO 14. To apply instrumental software tools for domain analysis, design, testing, visualization, measurement and documentation in practice.
PLO 15. To be motivated in selecting programming languages and development technologies to solve problems of creating and maintaining software.
PLO 17. To be able to apply component-based software development techniques.

14	Learning outcomes

To know:
- principles of software construction;
- methods for describing software behavior in accordance with project requirements;
- methods, technologies, and tools for creating program code;
- methods for constructing program code as a set of scripts.
To be able to:
- accurately perform the process of formalizing requirements for the software being developed from the user/client perspective;
- transform a set of software requirements into a collection of scenarios;
- understand the software design process as an iterative sequence of steps to refine scenarios through software behavior modeling and utilize software tools for this purpose;
- create a software description as a collection of interrelated scenarios;
- use software tools to build prototypes for studying the behavior and functionality of the software in accordance with user/client requirements;
- apply acquired software construction skills to practical tasks in applied fields.

15	Course content

SECTION 1. Methods and tools for software construction.
Topic 1. General model of software functionality.
Topic 2. Software behavior modeling.
Topic 3. Behavior scenarios. Software as a set of related scenarios.
Topic 4. Basis for describing software behavior scenarios.
SECTION 2. Practical use of methods and tools for software construction.
Topic 5. BDD approach to software behavior description.
Topic 6. BPMN approach to software development.
Topic 7. Tools for software design.

16	Books and materials

1. Eric Freeman, Elisabeth Robson. Head First Design Patterns, 2020, 672 p.
2. Iryna Borodkina, Heorhii Borodkin. Software Engineering: The Guide for University Students, 2018, 230 p.
3. E. Braude. Software Engineering Technology. Translated from English, 2004, 655 p.
4. S.A. Orlov. Software Development Technologies (Developing Complex Software Systems): Study Guide. Translated from English, Peter, 2002, 464 p.
5. L.A. Matsiashek. Requirements Analysis and System Design: Developing Information Systems Using UML. Translated from English, Williams Publishing House, 2002, 432 p.
6. Ian Sommerville. Software Engineering, 6th Edition. Translated from English, Williams Publishing House, 2002, 624 p.
7. Venderov. Software Design for Economic Information Systems. Translated from English, Peter, 2004, 655 p.
8. Steve McConnell. Code Complete: A Practical Handbook of Software Construction. Translated from English, 2013, 869 p.
9. Bohm, Corrado; and Giuseppe Jacopini (May 1966). Flow Diagrams, Turing Machines and Languages with Only Two Formation Rules. Communications of the ACM 9 (5): 366–371. doi:10.1145/355592.365646
10. Dijkstra, E. W. (Aug 1972). The Humble Programmer. Communications of the ACM 15 (10): 859–866. doi:10.1145/355604.361591.
11. http://www.cs.utexas.edu/~EWD/transcriptions/EWD03xx/EWD340.html. (EWD340) PDF, 1972 ACM Turing Award lecture
12. Dijkstra, E.W., Structured Programming, Software Engineering Techniques, Buxton, J.N., and Randell, B., eds. Brussels, Belgium, NATO Science Committee, 1969.
13. B. Meyer, Object-Oriented Software Construction, second ed., Prentice Hall, 1997, Chap. 6, 10, 11.
14. K. Beck, Test-Driven Development: By Example, Addison-Wesley, 2002

17	Course technical requirements

To work on the course, you will need regular access to a computer and the Internet. To successfully study and pass the exam, you should first explore the distance platform (Moodle) and study all folders that already contain or will contain information or materials for the course. You will also have to download and create documents, watch videos, or create them.
You can use distance platforms only using corporate e-mail.

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18	Learning process

The Software Construction course consists of lectures and laboratory classes.

Lectures use the following training methods:

lecture, conversation lecture, discussion, discussion of problematic issues, demonstration, analysis of various situations according to the lecture topic.

Laboratory classes use the following training methods:

questioning, testing, performing individual and team tasks, case studies, preparing reports and presentations, performing analytical and calculation works, solving specific problems and situations, brainstorming.

19	Discipline features

Period of teaching	Semester	International disciplinary integration	Year of study	Courses: general training/professional training/elective
1 semester	6th semester	not available	3rd year	Professional training course

20	Assessment policy

You will have various ways to show your knowledge and skills during the semester. This includes how you attend classes, how and what you contribute to class discussions, how you perform and submit practical tasks and tests on time, how you perform independent work tasks, as well as your ability to present your report. Additionally, you have the opportunity to complete an individual research task performed individually or in a small group in the form of a student research paper.

Activities during the semester	Maximum amount of points during the semester
Current work (attendance, oral questioning, solving calculation problems and tasks, situational exercises)	16
Tests (8 pcs.)	16
Laboratory works (8 pcs.)	24
Independent works	4
Total	**60**
Exam	**40**
Total	**100**

The minimum amount of points that should be obtained by students for current educational activities during a semester to be admitted to the final control is 36 points. The grade for the discipline is defined as a sum of the final points for current activities and the points for the final control and is expressed due to the multipoint scale.

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21	Grading scale

The grade for the discipline completing with the exam is determined as the sum of points for current learning activities (at least 36), points for individual independent work of students (no more than 6) and points for the exam (at least 24).

The overall points of the discipline are 100. The total grade for the discipline is given according to the national and European scale.

The final control in the form of an exam is carried out after learning all the topics of the discipline, during the examination session.

The overall final grade in points according to the national and ECTS scales is put into the examination and test register, academic card and credit book of students.

National and ECTS grading scale

Sum of points for all types of educational activities	ECTS grade	Grade according to the national scale	
		for exam, term paper, practical training	for Pass/Fail test
90-100	A	excellent	pass
82-89	B	good	pass
74-81	C	good	pass
66-73	D	satisfactory	pass
60-65	E	satisfactory	pass
30-59	FX	fail with possible repeated pass	fail with possible repeated pass
1-29	F	fail with obligatory repeated learning of the discipline	fail with obligatory repeated learning of the discipline

22	How to find out your grade

To check your grades for tasks and read your lecturer's comments, you should check appropriate tabs on Moodle distance learning platforms.

You can also obtain information about your grades directly from the course lecturer via corporate e-mail or by appointment on consulting days (room 505).

23	Course policy

To ensure fruitful learning and cognitive activities of students while studying the discipline, one holds relevant lectures and seminars in the form of presentations, group work, and discussion seminars.

During classes and at the University, students should respect lecturers, staff and other students, attend classes according to the schedule, come on time, and not leave classes without lecturer's permission. All academic assignments and works should be performed by the deadlines.

The teaching staff should constantly advance their professional level, teaching skills, general culture, as well as provide students with appropriate conditions for learning educational programs according to the requirements for the content, level and capacity of education, and encourage their comprehensive professional development.

Lecturers should follow the curriculum, not be late for classes, not allow any manifestations of corruption, discrimination, bullying, harassment and infringement of the students' rights.

Students who miss the current control for *valid reasons* confirmed by documents have the right to take current control **within two weeks** after returning to studying.

Students who have missed classes *without valid reasons*, have not participated in current control activities, have not liquidated academic failure are not admitted to the final semester control of this discipline. In this case, an academic staff member puts a mark 'non-admission' in the exam record.

Repeated taking of the exam in the discipline is appointed in case of accomplishing all types of educational, independent (individual) work stipulated by the working program of the academic discipline and is carried out according to the approved schedule of academic failure liquidation.

All participants in the educational process rely on the academic integrity principles.

24	Late task performance, correction of grades, making up missed classes

Tasks should be submitted via Moodle by the deadlines stipulated in the course schedule on our website. Most tasks should be performed by 9 a.m. on the day of the next class to coordinate them with the course content and group activities. It is best practice to perform tasks as soon as possible after receiving them so that you have enough time to take an active part in the class.

If you need more time to perform the task, flexible deadlines are available. Completed tasks will be accepted until full credit until the last scheduled class in the discipline. Afterwards, the 40% partial credit based on the grade will be awarded within a week after the last day of class. Tasks that are not submitted at all will receive 0.

If you are going to miss classes for more than one week due to illness or other reasons, please contact your lecturer to arrange alternative options for performing tasks.

25	Lecturer's response time

Via corporate e-mail, within 24 hours.

26	Efficient communication

Efficient communication is a two-way street!!!
Therefore, the main recommendations for efficient communication include: corporate e-mail directly to the course lecturer; personal communication with classmates via social media/corporate e-mails/mobile phones; communication directly in the course on the Moodle distance platform; and a face-to-face meeting with the lecturer on consulting days.

27	Policy of publication and distribution of course materials

Students are not allowed to post, publish, sell, or otherwise publicly distribute course materials without the written permission of the lecturer.
Such materials include, but are not limited to: lecture notes, lecture slides, video or audio recordings, tasks, problem sets, exams, other students' work, and answer keys.
Students who sell, post, publish, or distribute course materials without written permission in order to get answers or otherwise can be subject to disciplinary action, up to and including being required to withdraw from the course. Besides, students are not allowed to make video or audio recordings of the class for their own use without the written permission of the lecturer.

28	Expected student workload and engagement

During this course, you should allocate some hours for independent study of some lecture materials in accordance with the course topics (approximately 5-6 hours per week).
If you face circumstances requiring you to spend more time on any of the tasks, please inform your lecturer by e-mail.
The deadline for submission can be extended only if the lecturer is informed in advance that you will not be able to submit the task on 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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Lecture topic	Practical classes
Topic 1. General model of software functionality. Topic 2. Software behavior modeling.	1. Oral questioning 2. Laboratory work 1: Functional capabilities of the UNITY game development environment. 3. Questions submitted for independent study: To create an ATM operation model using MVS, MVC, and MVP approaches. 4. Tests
Topic 3. Behavior scenarios. Software as a set of related scenarios.	1. Oral questioning 2. Laboratory work 2: Development of the Gem Collector computer game using UNITY. General interface overview. 3. Questions submitted for independent study: To create an ATM operation model as a set of standard scenarios. 4. Tests
Topic 4. Basis for describing software behavior scenarios.	1. Oral questioning 2. Laboratory work 3: Development of the Gem Collector computer game using UNITY. Description of the environment. 3. Laboratory work 4: Development of the Gem Collector computer game using UNITY. Hero behavior. 4. Questions submitted for independent study: To develop a set of scenarios for a 2D game actor with movement functionality. 5. Tests
Topic 5. BDD approach to software behavior description.	1. Oral questioning 2. Laboratory work 5: Description of the learning process at an education institution using the BDD approach. 3. Laboratory work 6: Guess the Word interactive text game. Prototype implementation using TWINE. 4. Questions submitted for independent study: To develop a set of scenarios for tracking data changes in a 2D game with movement functionality. 5. Tests
Topic 6. BPMN approach to software development.	1. Oral questioning 2. Laboratory work 7: Description of the online store's functionality using Visio software. 3. Laboratory work 8: Description of the Gem Collector computer game using TWINE. 4. Questions submitted for independent study: To build a BPMN model of a student's learning process at a higher education institution using appropriate tools. 5. Tests
Topic 7. Tools for software design.	1. Oral questioning 2. Laboratory work 9: Description of the Gem Collector computer game as a Visio diagram. 3. Laboratory work 10: Description of the Gem Collector computer game as a BPMN model in the CAMUNDA environment. 4. Questions submitted for independent study: To implement a Tic-Tac-Toe game on a 5x5 grid using TWINE. 5. Tests

32	Tips on successful study during the course

If you want to succeed in this discipline, you should be:
- persistent, attentive and curious;
- creative, cheerful, and open to communication and discussions;
- ready to acquire information and knowledge about the subject not only during lectures but also during extracurricular activities.

See you at classes!