



MODERN SOFTWARE DEVELOPMENT TECHNOLOGIES

Work program of the academic discipline (Silabus)

Details of the discipline

Level of higher education *First (bachelor's) degree*

Field of expertise	<i>12 Information technologies</i>
Specialty.	<i>123 Computer engineering</i>
Educational program	<i>Computer systems and networks</i>
Status of the discipline	<i>Selective</i>
Form of study	<i>full-time/extramural</i>
Year of study, semester	<i>4th year, spring semester</i>
Scope of the discipline	<i>4 credits, 120 one</i>
Semester control / control measures	<i>Credit, ICR</i>
Class schedule	<i>//rozklad.kpi.ua</i>
Language of instruction	<i>Ukrainian</i>
Information about the course leader / teachers	Lecturer: Assistant Professor O. Shevelo alex.shevelo@gmail.com Laboratory: assistant Shevelo O.P. alex.shevelo@gmail.com
Placement of the course	https://comsys.kpi.ua

Program of the discipline

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

The purpose of teaching the discipline is to acquire the knowledge, skills and abilities necessary for a specialist who specializes in the development and design of modern software, especially backend.

The objectives of the discipline are:

- familiarization with the concepts and basic approaches to designing modern software;
- studying the principles and methods of choosing technologies for a specific task;
- studying technologies and principles of building high-load services;
- familiarization with the organization and methodology of organizing the work of development teams. As a result of studying the discipline, the student should:

Know:

- When basic programming knowledge (OOP, ASID, SOLID, etc.) is enough, and when you need to create your own approach;

- How to conduct Trade-of analysis and why it is needed;
- The full scope of elements that are included in the term "technology" in the development of modern software;
- Principles of working with risks and setting aside reserves for modification.

To be able to:

- understand the methods of technology selection in software development;
- determine the optimal technologies depending on the project;
- to navigate the design, construction, and operation of projects in the long term.

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

Required subjects: "Programming", "Object-oriented programming", "System programming", "Data structures and algorithms", "Software engineering", "Algorithms and methods of computing"

Disciplines that are based on the results of learning in this discipline: "System software", "Computer systems"

3. Content of the discipline

Section 1. The concept of technology

Topic 1.1. Definition of "technology"

Topic 1.2. The main elements of the system that influence the choice of technologies

Topic 1.3. Requirements for selected technologies that should prevent the project from reaching a dead end

Section 2. Methods of system analysis

Topic 2.1. System description schemes and their types

Topic 2.2. Risk analysis and Trade-of analysis

Chapter 3. Working with requirements

Topic 3.1. What are requirements, their types and why is it important

Topic 3.2. Methods of obtaining requirements

Section 4. Overview of the most popular technologies.

Topic 4.1: Types of Architectural Templates and their main purpose. Topic

4.2. Monoliths and their purpose and what technologies are suitable for them.

Topic 4.3. Microservices and their purpose and what technologies are suitable for them.

Topic 4.4. Serverless systems and their purpose and what technologies are suitable for them. Topic 4.5. Types of databases and methods of choosing the type for the project

Topic 4.5. Types of databases and methods of choosing the type for the project

Section 5. Technologies for further development and support of the project

Topic 5.1. How to avoid a dead end by choosing the wrong technologies

Topic 5.2. Refactoring/reengineering/optimization and the technologies needed for them

Section 6. Server support technologies. Topic

6.1. Cloud services and their purpose Topic 6.2.

Methods of choosing cloud services

Topic 6.3. Reasons not to use cloud services

Chapter 7. Modern technologies for organizing development teams. Topic 7.1. AGILE base

Topic 7.1. AGILE base

4. Training materials and resources. Basic:

1. Pierre Bourque, Richard Fairley, Guide to the Software Engineering Body of Knowledge, Version 3.0 SW
2. I. Sommerville, Software Engineering, 10th ed., Addison-Wesley, 2016
3. K.E. Wiegers, Software Requirements, 3rd ed.
4. P. Clements et al., Documenting Software Architectures: Views and Beyond, 2nd ed., Pearson Education
5. D. D. Budgen, Software Design, 2nd ed., Addison-Wesley, 2003
6. L. Bass, P. Clements, and R. Kazman, Software Architecture in Practice, 3rd ed.

Additional:

1. Steve McConnell, Software Estimation: Demystifying the Black Art
2. John Dooley, Software Development and Professional Practice
3. Robert C. Martin, Clean Code: A Handbook of Agile Software Craftsmanship

Educational content

5. Methods of mastering the discipline (educational component)

Full-time form of study

Titles of sections and topics	Number of hours			
	Total	Including.		
		Lectures	Laboratory. no occupation	SRS
Section 1. The concept of technology Topic 1.1. Definition of "technology" Topic 1.2. The main elements of the system that influence the choice of technologies	7	2	1	4

Topic 1.3. Requirements for selected technologies that should prevent the project from reaching a dead end				
Section 2. Methods of system analysis Topic 2.1. System description schemes and their types Topic 2.2. Risk analysis and Trade-of analysis	10	4	2	4
Chapter 3. Working with requirements Topic 3.1. What are requirements, their types and why is it important Topic 3.2. Methods of obtaining requirements	7	2	1	4
Section 4. Overview of the most popular technologies. Topic 4.1: Types of Architectural Templates and their main purpose. Topic 4.2. Monoliths and their purpose and what technologies are suitable for them. Topic 4.3. Microservices and their purpose and what technologies are suitable for them. Topic 4.4. Serverless systems and their purpose and what technologies are suitable for them. Topic 4.5. Types of databases and methods of choosing a type for a project	40	12	8	20
Chapter 5 . Technologies for further development and support of the project Topic 5.1. How to avoid a dead end by choosing the wrong technologies Topic 5.2. Refactoring/reengineering/optimization and the technologies needed for them	15	4	1	10
Section 6. Server support technologies. Topic 6.1. Cloud services and their purpose Topic 6.2. Methods of choosing cloud services Topic 6.3. Reasons not to use cloud services	11	4	3	4
Chapter 7. Modern technologies for organizing development teams. Topic 7.1. AGILE base Topic 7.2. SCRUM vs CANBAN	12	5	2	5
ICR	6	1		5
Credit	12	2		10
Together	120	36	18	66

Part-time education

Titles of sections and topics	Number of hours			
	Total	Including.		
		Lectur es	Laboratory. no occupation	SRS
Section 1. The concept of technology Topic 1.1. Definition of "technology" Topic 1.2. The main elements of the system that influence the choice of technologies	10	1	1	8

Topic 1.3. Requirements for selected technologies that should prevent the project from reaching a dead end				
Section 2. Methods of system analysis Topic 2.1. System description schemes and their types Topic 2.2. Risk analysis and Trade-of analysis	9		1	8
Chapter 3. Working with requirements Topic 3.1. What are requirements, their types and why is it important Topic 3.2. Methods of obtaining requirements	5	1		4
Section 4. Overview of the most popular technologies. Topic 4.1: Types of Architectural Templates and their main purpose. Topic 4.2. Monoliths and their purpose and what technologies are suitable for them. Topic 4.3. Microservices and their purpose and what technologies are suitable for them. Topic 4.4. Serverless systems and their purpose and what technologies are suitable for them. Topic 4.5. Types of databases and methods for selecting a type for a project	25	1	2	22
Chapter 5 . Technologies for further development and support of the project Topic 5.1. How to avoid a dead end by choosing the wrong technologies Topic 5.2. Refactoring/reengineering/optimization and the technologies needed for them	17	1		16
Section 6. Server support technologies. Topic 6.1. Cloud services and their purpose Topic 6.2. Methods of choosing cloud services Topic 6.3. Reasons not to use cloud services	18	1	2	15
Chapter 7. Modern technologies for organizing development teams. Topic 7.1. AGILE base Topic 7.2. SCRUM vs CANBAN	18	1	2	15
ICR	6	1		5
Credit	12	1		11
Together	120	8	8	104

The purpose of the cycle of laboratory work is to provide students with the necessary practical skills in using modern software development technologies.

Full-time form of study

№	Name of the laboratory work	Number of aud. hours
1	Choosing a project topic and initial requirements for it	2

2	Main diagrams and charts of the project	4
3	Choosing a technology stack for the project	6
4	Choosing a project organization methodology	6

Part-time education

No	Name of the laboratory work	Quantity. aud. hours
1	Choosing a project topic and initial requirements for it	2
2	Main diagrams and charts of the project	2
3	Choosing a technology stack for the project	2
4	Choosing a project organization methodology	2
	Together	8

6. Independent work of the student

Preparation for laboratory classes 18 hours. Preparation for module tests 8 hours. Preparation for the test 10 hours.

Policy and control

7. Policy of the academic discipline (educational component)

During the academic discipline, students must adhere to certain disciplinary rules:

- 1) It is forbidden to be late for classes;
- 2) at the entrance of the teacher, as a sign of greeting, students of Igor Sikorsky Kyiv Polytechnic Institute should stand up;
- 3) no outside conversations or other noise that interferes with the conduct of classes are allowed;
- 4) leaving the classroom during class is allowed only with the permission of the teacher.
- 5) use of cell phones and other technical means without the permission of the teacher is not allowed.

Laboratory works are submitted in person with a preliminary check of theoretical knowledge required to perform the laboratory work. The practical results are checked by checking the code and performing test tasks.

In the course of training, the teacher has the right to award up to 5 incentive points for early completion of laboratory work, for the creative approach shown in the performance of individual assignment or for active participation in the discussion of issues related to the topic of the lecture or practical lesson.

For completing and submitting a laboratory work after the deadline, for a significant number of missed classes, or for violating the rules of behavior in class, the teacher may assign up to 5 penalty points.

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

- Ongoing control: performance of laboratory work
 - Calendar control: completing a module test
- is conducted twice a semester as a monitoring of the current state of fulfillment of the silaBus requirements.

Semester control: credit

Conditions for admission to the semester control: semester rating of more than 40 points.

The evaluation of certain types of academic work performed by the student is carried out in points:

View educational work	Mach number of points	Total number of points
Performing and defending laboratory work 1	15	85
Performing and defending laboratory work 2	20	
Performing and defending laboratory work 3	25	
Performing and defending laboratory work 4	25	
Performing modular control work		15
Together		100
Credit (optional)	30	

Table of correspondence between rating points and grades on the university scale:

<i>Number of points</i>	<i>Assessment.</i>
100-95	Excellent
94-85	Very good
84-75	Okay.
74-65	Satisfactory
64-60	Enough
Less than 60	Unsatisfactory
The conditions for admission are not met	Not allowed

9. Additional information on the discipline (educational component)

the list of theoretical issues to be submitted for semester control is given in Appendix 1

A condition for receiving extra points.

As part of the study of the discipline « Modern technologies of software development

provision»

points obtained as a result of distance learning courses on the Coursera platform may be credited, subject to prior approval of the course program by the instructor and upon receipt of an official certificate.

Work program of the discipline (syllabus):

Compiled by the Assistant of the Department of Computer Science, Shevelo O.P.

Approved by the Department of Computer Science (Minutes No. 10 of 25.05.2022)

Approved by the Methodological Commission of the Faculty (Minutes No. 10 of 09.06.2022)

...