Syllabus
Course Program

Software Testing

Specialty
123 – Computer Engineering

Institute
Educational and Scientific Institute of Computer Science and Information Technology

Educational program
Modern programming, mobile devices and computer games

Department
Computer Engineering and Programming (326)

Level of education
Bachelor's level

Course type
Optional discipline of the profile preparation (Optional educational component)

Semester
8

Language of instruction
English

Lecturers and course developers

Viktor Chelak

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PhD in Computer Engineering, Lecturer at Computer Engineering and Programming Department
Author and co-author of more than 50 scientific and methodical publications. Main courses: "Antivirus Protection" (in Ukrainian), "Reverse Programming" (in English), "Software Information Security" (in English), Fundamentals of Program and Data Security (in Ukrainian), "Artificial Intelligence in Computer Games" (in Ukrainian).
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Links to SCOPUS, WoS, Google Scholar profiles:
1. https://www.scopus.com/authid/detail.uri?authorId=57189040595;
2. https://www.webofscience.com/wos/author/record/GZM-2102-2022;
3. https://scholar.google.com/citations?user=lyz9FRQAAAAJ&hl=uk.
More about the lecturer on the department's website

Serhii Bulba

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candidate of technical sciences, associate professor, associate professor of the department of computer engineering and programming
Author and co-author of more than 40 scientific and methodical publications. Main courses: "Algorithms and data structures", "Software testing".
Детальніше про викладача на сайті кафедри

General information

Summary

"Software testing" is one of the courses of free choice disciplines that continues the fundamental training of bachelors under the educational program "Modern programming, mobile devices and computer games (innovation campus)". The discipline is aimed at students' acquisition of theoretical and practical knowledge in the field of computer software testing. The educational component provides the ability of specialists to master modern methods of software quality assessment, methods of verification and validation of software products, methods and means of testing.

Course objectives and goals

Formation of basic knowledge about software testing methods and tools, basic approaches to conducting various types of testing, basic types of test documentation, training of specialists capable of analyzing, choosing, and applying software testing methods and tools to solve various tasks of professional activity.

Format of classes

Lectures, practical work, calculation tasks, independent work, consultations. Final control - exam

Competencies

SC3. Ability to create system and application software for computer systems and networks;
SC16. Ability to design, develop and apply databases.

Learning outcomes

PLR 10. Be able to develop software for embedded and distributed applications, mobile and hybrid systems, calculate, operate equipment typical for the specialty;
PLR 19. Be able to test software;
PLR 20. Be able to create and maintain databases;
PLR 25. Ability to adapt to new situations, justify, make and implement decisions within the competence;

Student workload

The total volume of the course is 120 hours (4 ECTS credits): lectures - 20 hours, workshops - 30 hours, self-study - 70 hours.

Course prerequisites

To study the course, students need basic knowledge of the disciplines: "Programming", "Probability Theory", sufficient for:
- research of the processes of saving, accumulating, transforming, transferring data and information using computer technology;
- study of decision-making methods;
- studying the basics of programming;

Features of the course, teaching and learning methods, and technologies

Presentation, lecture-conversation, lecture-visualization, educational discussion, brainstorming, case method, demonstration, independent work, method of comparison, method of generalization, method of concretization, method of highlighting the main, discussion, work on errors.
Studying the course requires the use of Microsoft Visual Studio software or
Visual Studio Code, Intellij IDEA, eclipse, PyCharm, in addition to commonly used programs and operating systems. Multimedia board, projector.

Program of the course

Topics of the lectures

Topic 1. Fundamentals of software development project management.
Software development models. Life cycle of testing.
Topic 2. Testing as a means of ensuring the quality of a software product.
Software verification and validation.
Topic 3. Testing documentation and requirements.
Requirements Levels and types of requirements. Requirements testing techniques
Topic 4. Types and directions of testing.
Classification from execution code launch. Code access and application architecture classification. Classification by (decreasing) degree of importance of tested functions. Classification according to the principles of working with the application. Classification by focusing on the application architecture level. Classification by level of formalization. Classification by goals and objectives. Classification of techniques and approaches. Classification at the time of execution (chronology).
Topic 5. Testing artifacts
Checklists, test cases, sets of test cases. Test management tools.
Topic 6. Defect reports
Defect report attributes (fields). Defect report management tools. The logic of creating effective defect reports.
Topic 7. Evaluation of labor costs, planning and reporting.
Planning and reporting. Test plan and test results report. Estimation of labor costs.
Topic 8. Testing techniques
Positive and negative test cases. Equivalence classes and boundary conditions. Domain testing and parameter combinations. Pair testing and search for combinations. Exploratory testing.
Topic 9. Automation of testing
Advantages and disadvantages of automation. Applications of automation. Peculiarities of test cases in automation. Testing automation technology.

Topics of the workshops

Topic 1. Requirements for the software product. Requirements testing.
Properties of quality requirements. Requirements analysis and testing.
Topic 2. Types and directions of testing.
Conduct software testing according to the selected types of testing.
Topic 3. Testing artifacts.
Checklists, test cases, sets of test cases.
Topic 4. Defect reports.
Creation of a report on detected defects.
Topic 5. Evaluation of labor costs, planning and reporting.
Creation of test reports.
Topic 6. Automated testing.
Development of automated tests using JUnit and Selenium.

Topics of the laboratory classes

Laboratory work within the discipline is not provided.

Self-study

Elaboration of lecture material.
Preparation for practical classes and modular controls.
Self-study of topics and issues that are not taught in lectures: Integrated development environment Microsoft Visual Studio or, Intellij IDEA, eclipse, PyCharm. Description of the functioning of the blocks. Model development. Development of educational material, preparation for classroom classes, implementation of project tasks. Acquaintance with analogues of the considered methods

Course materials and recommended reading

BASIC READING

1. Kulikov S. Software testing. Base course.: Book version 3.2.2/ EPAM Systems., 2022 – 280 c.
2 Knott, D. (2019). Hands-On Mobile App Testing - 2nd Edition: A guide for mobile testers and anyone involved in the mobile app business. Packt Publishing.
3 Winter, A. (2016). Team Guide to Software Testability: Better software through greater testability (Team Guides for Software). O'Reilly Media.
4 Chhavi Raj Dosaj (2020) The Self-Taught Software Tester: A Step-By-Step Guide to Learn Software Testing Using Real-Life Project.

ADDITIONAL READING

5 Pradeep Soundararajan (2020). *Buddha in Testing: Finding Peace in Chaos.* Independently Published. ISBN-13: 978-1647608514.

INFORMATION RESOURCES ON THE INTERNET

Website of the Department of Computer Engineering and Programming: https://web.kpi.kharkov.ua/cep/.
The lecturer's personal website: https://victor.chelak.com.ua/.

Assessment and grading

Criteria for assessment of student performance, and the final score structure

The assessment is carried out on a 100-point scale. Points are awarded according to the following ratio: modular controls - 20 points; workshops - 60 points; exam - 20 points.

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.
Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Approval

Approved by	Date, signature	Head of the department Oleksandr ZAKOVOROTNYI
	Date, signature	Guarantor of the educational program Nikolai ZAPOLOVSKY