

SOFTWARE QUALITY, TESTING AND SUPPORT

COURSE SYLLABUS

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|-----------------------------------|--|--------------------------------|--|
| Code and name of specialty | 122 Computer Science | Institute / faculty | Faculty of Computer Science and Software Engineering |
| Program name | “Computer Science and Intelligent Systems” | Department | Software Engineering and Management Information Technologies |
| Type of program | Educational and Professional | Language of instruction | Ukrainian, English |

LECTURER

Name, E-mail

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Ph.D., Associate Professor of the Department of Software Engineering and Management Information Technologies, NTU «KhPI». Prepared and published more than 30 research papers, 5 articles in publications indexed in Scopus) (ORCID: <https://orcid.org/0000-0002-5040-5861>).

Leading lecturer of courses: *Internet of Things Fundamentals, Information Retrieving and Semantic Web (in Ukrainian and English)*

GENERAL DESCRIPTION OF THE COURSE

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| Summary | The course "Software quality, testing and support" is a course in the cycle of professional compulsory training of the specialty 122 "Computer science". It is taught in the six semester in the amount of 90 hours (5 ECTS credits), in particular: lectures – 32 hours, laboratory classes – 32 hours, self-study work – 26 hours. The course includes two modules and one modular test. The study of the discipline ends with the test. |
| Course objectives | Teaching students the methodology of analysis and evaluation of software quality, which allows at the stage of software development (software) to solve the following main tasks: choose a model of software quality at the level of IT company, IT product or IT processes; prepare a test strategy and test plan implemented in the test automation system; choose a specific set of testing tools and support to implement a testing strategy or plan. |
| Types of classes and control | Lectures, workshops, self-study work (and individual calculation work). Final assessment – test. |
| Term | 6 |

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|--|---------------|-------------------------|----|--------------------------|----|---------------------------|----|
| Student workload (credits) / Type of course | 3 / Mandatory | Lectures (hours) | 32 | Workshops (hours) | 32 | Self-study (hours) | 90 |
|--|---------------|-------------------------|----|--------------------------|----|---------------------------|----|

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| Program competences | <p>GC1. Ability to abstract thinking, analysis and synthesis.</p> <p>GC2. Ability to apply knowledge in practical situations.</p> <p>GC3. Knowledge and understanding of the subject area and understanding of professional activity.</p> <p>GC6. Ability to learn and master modern knowledge.</p> <p>GC7. Ability to search, process and analyze information from various sources.</p> <p>GC9. Ability to work in team.</p> <p>GC10. The ability to be critical and self-critical.</p> <p>GC12. Ability to evaluate and ensure the quality of performed work.</p> <p>PC10. Ability to apply methodologies, technologies, and tools to manage the life cycle processes of information and software systems, information technology products and services according to customer requirements.</p> <p>PC13. Ability to develop network software that operates based on different topologies of structured cable systems, uses computer systems and data networks, and analyzes the quality of computer networks.</p> |
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| Learning outcomes | Teaching and learning methods | Forms of assessment (continuous assessment CAS, final assessment FAS) |
|--|---|---|
| PLO9. Develop software models of subject areas, choose a programming paradigm from the standpoint of convenience and quality of its application to implement methods and algorithms that solve problems in the computer science field. | Interactive lectures with presentations, discussions, workshops, teamwork, case method, feedback method from students, problem learning | Written individual assignments for workshops (CAS), assessment of knowledge in workshops (CAS), express - survey(CAS), online tests (CAS), final / semester control in the form of a semester test, in accordance with the schedule of the educational process (FAS) |
| PLO11. Have the skills to manage the life cycle of software, products, and services of information technology under the requirements and restrictions of the customer, be able to develop project documentation (feasibility study, technical task, business plan, agreement, contract). | Interactive lectures with presentations, discussions, workshops, teamwork, case method, feedback method from students, problem learning | Written individual assignments for workshops (CAS), assessment of knowledge in workshops (CAS), express - survey(CAS), online tests (CAS), final / semester control in the form of a semester test, in accordance with the schedule of the educational process (FAS) |

ASSESSMENT AND GRADING

| Ranges of poin corresponding grades | Total score (points) all types of learnin activities | ECTS grading scale | The national grading scale | Allocation of grade points | 100% Final assessment as a result of Final test (30%) and Continuous assessment (70%). |
|--|---|---------------------------|-----------------------------------|-----------------------------------|---|
| | 90-100 | A | excellent | | |
| | 82-89 | B | good | | |

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|--|-------|----|--------------|---|--|
| | 74-81 | C | satisfactory | 30% Final test 70% Continuous assessment: Workshop (40%) One module test (30%) | |
| | 64-73 | D | | | |
| | 60-63 | E | | | |
| | 35-59 | FX | | | Unsatisfactory (with the exam retak option) |
| | 0-34 | F | | | Unsatisfactory (with mandatory repetition of the course) |

Course policy Students are required to attend classes as scheduled and comply with ethical conduct. If absent, students will need to complete all tasks to compensate for the missed classes. Participation in workshops requires preliminary preparation and advance processing of all the necessary materials for productive discussions during the session. Written assignments must be submitted on time.

COURSE STRUCTURE AND CONTENT

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| Topic 1 | The concept of software quality and reliability | Workshop 1 | Create a test software system for further experimentation with testing in Java, C #, Javascript, or PHP. | Individual work | Study of software reliability models and analysis of the possibility of their implementation. |
| Topic 2 | Software quality models at the level of the company's IT, process and IT product | Workshop 2 | Preparation of documentation for creating a test plan in the form of software requirements in UML and using the IDEF methodology | | Overview of existing IT product quality models |
| Topic 3 | Software quality characteristics | Workshop 3 | Calculations of values of typical quality metrics on the basis of the developed software artifacts | | Analysis of software quality metrics according to the SWEBOK model |
| Topic 4 | The place of verification and testing processes in the software life cycle | Workshop 4 | Use of metric theory of programs for conducting test experiments | | Study of existing methods of testing "white box" |
| Topic 5 | Testing criteria (structural, functional, mutational, random and others) | Workshop 5 | Application of structural testing criteria | | Exploring existing black box testing methods |
| Topic 6 | Classification of software errors | Workshop 6 | Features of application of testing criteria within OOP paradigm | | Analysis of features and implementation of an experiment on testing a web project online |
| Topic 7 | Test plans. Structure and purpose. Construction algorithm | Workshop 7 | Use components to automate testing in Java, C #, Javascript, or PHP programming environments | | Review of testing automation systems |
| Topic 8 | Software verification and testing support systems | Workshop 8 | Creating test plans. Control of elimination of software errors by means of the special software. | | Study of elimination control systems errors online |

RECOMMENDED READING

Compulsory

1. A. Mili, F.(2015) Tchien. Software Testing Concepts and Operations John Wiley & Sons, Inc.
2. Singh. Y. (2012) SOFTWARE TESTING. Cambridge University Press.
3. P. Ammann, J. Offutt. (2008) INTRODUCTION TO SOFTWARE TESTING. Cambridge University Press.
4. Graham, Veenendaal, D. Evans, E. I., Black. R.(2018) FOUNDATIONS OF SOFTWARE TESTING. ISTQB CERTIFICATION. Thomson.
5. Pezzè, M. (2008) Young. Software Testing and Analysis: Process, Principles, and Techniques.
6. K. NAIK, TRIPATHY P.(2008) SOFTWARE TESTING AND QUALITY ASSURANCE Theory and Practice. John Wiley & Sons, Inc.
7. Hutcheson M.(2003) Software Testing Fundamentals. Methods and Metrics. Wiley Publishing Inc.
- 8 Standard for Software Verification and Validation Plans (ANSI / IEEE standard 1012-1986).

Recommended

9. С. Куликов.(2021) Тестирование программного обеспечения. Базовый курс. EPAM Systems,
10. Введення в програмну інженерію і управління життєвим циклом програмного забезпечення Guide to Software Engineering Base of Knowledge (SWEBOK): Пер. з англ. С.Орлик [Електронний ресурс] - Режим доступу: sorlik.blogspot.com/.
- 11.Г. Майерс. (1980) Надежность программного обеспечения. М.: МИР,
12. Г. Майерс. (1982) Искусство тестирования программ. М.: Финансы и статистика,
13. К.Бек.(2003) Экстремальное программирование: разработка через тестирование. – Санкт-Петербург: Питер,
14. Бейзер Б. (2004) Тестирование черного ящика. Технологии функционального тестирования ПО и систем. Санкт-Петербург.:
15. McCabe T.J. A (1976) Complexity Measure // IEEE Transactions on Software Engineering. V.2, № 4,.
16. С. Канер.(2001) Тестирование программного обеспечения. Фундаментальные концепции менеджмента бизнес приложений. Киев: Диасофт,
17. Тамре. Л.(2003) Введение в тестирование программного обеспечения. Москва: Вильямс,

Academic integrity

Graduate students are expected to adhere to the Code of Ethics of Academic Relations and Integrity” of NTU “KhPI”.

The content of this syllabus is consistent with the course program.