



SYLLABUS OF THE COURSE " SOFTWARE SYSTEMS DESIGN"

Educational program component – mandatory (3 credits)

Educational and professional program	Information technology and project management
Specialty	122 – Computer science
Discipline	12 – Information technology
Level of higher education	first (bachelor's)
Language of instruction	English
Teacher(s) profile	Piddubna Larysa Andriivna, Candidate of Physical and Mathematical Sciences, Associate Professor https://mathmod.chnu.edu.ua/pro-nas/spivrobotnyky/piddubna-larysa-andriivna/
Contact phone number	+380372584825
Email:	l.piddubna@chnu.edu.ua
Course page in Moodle	https://moodle.chnu.edu.ua/course/view.php?id=4861
Consultations	By arrangement

SUMMARY OF THE COURSE

The purpose of the discipline is to provide students with theoretical knowledge of system software architecture, construction, operation, use of operating system tools, container technology for implementing packaging, deployment and operation of software.

The subject of the discipline is the study of the principles of construction, architecture, basic functions, operating modes, and operating system tools (OS).

Tasks. As a result of studying the discipline, students should develop the following competencies:

ZK9. Ability to work in a team.

ZK10. Ability to be critical and self-critical.

ZK11. Ability to make informed decisions.

FC5. Ability to carry out a formal description of operations research tasks in organizational, technical and socio-economic systems for various purposes, determine their optimal solutions, build optimal management models taking into account changes in the economic situation, optimize management processes in systems for various purposes and levels of hierarchy.

FC6. Ability to think systems, apply the methodology of systems analysis to study complex problems of various natures, methods of formalization and solving system problems that have conflicting goals, uncertainties and risks.

FC7. Ability to apply theoretical and practical foundations of modeling methodology and technology to study the characteristics and behavior of complex objects and systems, conduct computational experiments with processing and analysis of results.

FC8. Ability to design and develop software using different programming paradigms: generalized, object-oriented, functional, logical, with appropriate models, methods and algorithms of calculations, data structures and control mechanisms.

Learning outcomes:

Discipline objectives. The knowledge and experience acquired in studying this discipline will be useful in the future practical activities of students in the design and development of programs, systems, in-depth study of computer science, conducting extracurricular knowledge circles in computer science.

To achieve the goal, the following main tasks are set:

- study of concepts, principles, methodology and technologies for creating software products as a set of processes for developing software systems based on the life cycle (LC) of information systems software;

- study of the purpose of the object-oriented approach to designing information systems software;

- study of software standards;

- study of methods for creating requirements during the development of software products;

- study of methods and means of testing software using modern means of testing software products;

- study of quality standards when creating information systems software;

- study of tools and their practical application when designing information systems software.

The presented learning outcomes for the relevant discipline correspond to the following program learning outcomes:

PRN5. Design, develop and analyze algorithms for solving computational and logical problems, evaluate the efficiency and complexity of algorithms based on the use of formal models of algorithms and computable functions.

PRN7. Understand the principles of modeling organizational and technical systems and operations; use methods of operations research, solving single- and multi-criteria optimization problems of linear, integer, nonlinear, stochastic programming.

PRN8. Use the methodology of systems analysis of objects, processes and systems for the tasks of analysis, forecasting, management and design of dynamic processes in macroeconomic, technical, technological and financial objects.

PRN9. Develop software models of subject environments, choose a programming paradigm from the standpoint of convenience and quality of application for the implementation of methods and algorithms for solving problems in the field of computer science.

PRN10. Use client-server application development tools, design conceptual, logical and physical database models, develop and optimize queries to them, create distributed databases, data warehouses and showcases, knowledge bases, including on cloud services, using web programming languages.

PRN11. Have the skills to manage the life cycle of software, information technology products and services in accordance with the requirements and limitations of the customer, be able to develop project documentation (feasibility study, technical specifications, business plan, agreement, contract).

EDUCATIONAL CONTENT OF THE EDUCATIONAL COMPONENT

MODULE 1. SOFTWARE. LIFE CYCLE AND DEVELOPMENT STAGES	
Topic 1	Basic issues. Types of software.
Topic 2	Life cycle and stages of software development.
MODULE 2. STANDARDIZATION OF SOFTWARE DEVELOPMENT.	
Topic 3	International ISO standards
Topic 4	IEEE standards.
Topic 5	Well-known software standards
MODULE 3. MODERN SOFTWARE DEVELOPMENT METHODOLOGIES	
Topic 6	Flexible and Rigid Strategies
Topic 7	Software Architecture
Topic 8	Design Patterns
Topic 9	Software Quality
Topic 10	Basic Market Requirements for Software
Topic 8	Оцінка ризиків ІТ проєктів
Topic 9	Документальний супровід ІТ проєктів

FORMS, METHODS AND EDUCATIONAL TECHNOLOGIES OF TEACHING

(description of forms, methods and technologies of teaching,
which are used in the process of studying the academic discipline)

By the source of transmission and perception of educational information by students:

- o verbal (lecture, explanation, conversation, instruction);
- o visual (illustration, demonstration);
- o practical (projects).

By the logic of transmission and perception of educational information by students:

- o informational-receptive;
- o reproductive;
- o problem-based;
- o partially-search (heuristic).

By stimulation of educational and cognitive activity:

- o methods of stimulating cognitive needs and interests;
- o methods of stimulating duty and responsibility.

FORMS AND METHODS OF CONTROL AND ASSESSMENT

Current control: The forms of current control are laboratory work.

Final control - The form of final control is a test.

LEARNING OUTCOMES ASSESSMENT CRITERIA

The system of assessing the level of educational achievements is based on the principles of ECTS and is cumulative. Knowledge assessment is carried out on a 100-point scale. The results of work during the academic semester are assessed during current and modular control in the range from 0 to 70 points in total, and the results of final control (test) - from 0 to 40 points.

During the semester, students perform 5 laboratory works, each of which is a continuation of the previous one. Laboratory works are assessed with points: 15, 15, 10, 15, 15 for the full completion of tasks.

Performing laboratory tasks involves independent processing of additional information sources and home completion of tasks started in the classroom. In case of insignificant errors in completing tasks, 1-2 points are deducted, and significant ones, unsubstantiated application of methods or failure to complete tasks - 3-5 points. In case of completing certified courses on educational platforms and timely submission of certificates, it is possible to transfer a certificate instead of laboratory work on the relevant topic. Additionally, you can get up to 14 points for completing additional tasks.

The final control in the discipline is a test in the form of a test in the moodle system. The test option contains 20 questions with one correct answer, each of which is estimated at 1 point.

The final grade is given based on the results of the sum of points scored on substantive modules during the semester and the final module (exam).

ACADEMIC INTEGRITY POLICY

Adherence to the academic integrity policy by participants in the educational process when studying an academic discipline is regulated by the following documents:

- ✓ "Code of Ethics of Yuriy Fedkovych Chernivtsi National University"
https://www.chnu.edu.ua/media/jxdfs0zb/etychnyi-kodeks-chernivets_koho-natsionalnoho-universytetu.pdf
- ✓ "Regulations on the detection and prevention of academic plagiarism at Yuriy Fedkovych Chernivtsi National University"
https://www.chnu.edu.ua/media/n5nbzwgb/polozhennia-chnu-pro-plahi_at-2023plusdodatky-31102023.pdf

The applicant is obliged to complete all received tasks in a timely and high-quality manner; if necessary, in order to clarify all unclear issues during independent and individual work, to attend consultations with the teacher. Students are also obliged to adhere to the rules of academic integrity in accordance with the "Code of Ethics of the ChNU". The policy of observing academic integrity (in accordance with the Law of Ukraine "On Education") is that teaching an academic discipline is based on the principles of academic integrity - a set of ethical principles and rules defined by law, which should be guided by participants in the educational process during training, teaching and conducting scientific (creative) activities in order to ensure trust in the results of training and/or scientific (creative) achievements. The presence of academic plagiarism in student works is grounds for assigning a negative grade. Cheating by students during testing is grounds for early termination of its completion and assigning a negative grade

INFORMATION RESOURCES

1. Project Management Institute. (2019). A Guide to the Project Management Body of Knowledge (PMBOK(R) Guide-Sixth Edition / Agile Practice Guide Bundle (HINDI). [N.p.]: Project Management Institute. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=2240462>
2. The Scrum Guide™ [Електронний ресурс]. – 2017. - Режим доступу до ресурсу: <https://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-US.pdf#zoom=100>

3. Azure DevOps documentation [Электронный ресурс]. – 2020. – Режим доступа до ресурсу: <https://docs.microsoft.com/en-us/azure/devops/?view=azure-devops>.