Syllabus of the educational discipline
«*Distributed and parallel computing*»

Спеціальність	*121 "Software Engineering"*
Освітня програма	*Software Engineering*
Освітній рівень	*The first (Bachelor) level of higher education*
Статус дисципліни	*Mandatory*
Мова викладання	*English*
Курс / семестр	*4 year, 7 semester*
Кількість кредитів ЄКТС	*6*
Розподіл за видами занять та годинами навчання	*Lectures – 24 hours*
	Laboratory studies – 36 hours.
	Self-study – 120 hours.
Форма підсумкового контролю	*Grading including Exam*
Кафедра	*Information Systems, Room 413 (Main Building), (057)702-18-31, site:* [*http://www.is.hneu.edu.ua/*](http://www.is.hneu.edu.ua/)
Викладач (-і)	*Minukhin Serhii Volodymyrovych, Doctor of Technical Sciences, Professor*
Контактна інформація викладача (-ів)	*Minukhin Serhii: serhii.minukhin@hneu.net*
Дні занять	*Lectures:* [*Acording to the schedulte*](#) *Lectures:* [*Acording to the schedulte*](#)
Консультації	*According to the schedule at the Information System Department, chat PNS*

The purpose of the discipline: formation of a system of theoretical knowledge and acquisition of practical skills in the use of distributed systems, technologies, installation and configuration of appropriate software to run and perform tasks on a computer cluster and use technologies and tools of parallel programming based on OpenMP and MPI.

Prerequisites for learning:
List of previously listened disciplines: Computer Networks, Programming, Operating Systems

Content of the educational discipline

Content module 1. *Classification, architecture and technologies of distributed systems.*

Theme 1. Introduction. Basic concepts and classification of distributed computing systems (ROS). Classification of grid systems. Composition and purpose of levels of open architecture of grid.

Theme 2. Principles of data processing in distributed systems. The concept and composition of the intermediate software of grid systems: Globus Toolkit, glite, ARC, Gridway, Condor, SETI @ HOME.

Theme 3. OGSA architecture for DCS. The concept and classification of resource management systems. Concepts and types of resource brokers. Task schedulers. Local resource management systems.

Theme 4. Information services and DCS systems. Composition and purpose of information systems. Organization of information systems based on R-GMA and MDS architectures.

Theme 5. Industrial grid systems, access tools and task launch. Economic models of DCS.

Content module 2. *Technologies of parallel computing*

Theme 6. The concept and classification of parallel computing systems (PIC). Flynn's, Gustavson's classifications. Multiprocessor and multicomputer systems.

Theme 7. Serial and parallel programming models. Parallel programming models: task parallelism and data parallelism. Basic stages of parallel program development (algorithm). Organization of multithreaded programs.

Theme 8. OpenMP technology for parallelization of programs.

Theme 9. Software features of OpenMP-program implementation.

Theme 10. Technology of parallelism based on MPI messaging.

Theme 11. Features of software implementation of parallel programs.

Material and technical support (software) of the discipline

Multimedia projector, Internet

VMWare Workstation, Player, Oracle VM VirtualBox.

All software components are open source.

Course page on the Moodle platform (personal training system)	*https://pns.hneu.edu.ua/*

Learning outcomes assessment system

The system of assessment of the formed learning outcomes in the course is carried out on the basis of assessment of tasks during lectures, laboratory classes, as well as the performance of self study. Assessment of student learning outcomes is carried out on a cumulative 100-point system. The current control, which is carried out during the semester during laboratory classes and self study, is estimated by the sum of points scored. The maximum possible number of points for the current and final control during the semester - 100 and the minimum possible number of points - 60.

More detailed information on assessment is given in the technological map of the course.

Course policies

The teaching of the course is based on the principles of academic integrity. Violations of academic integrity are: academic plagiarism, fabrication, falsification, write-off, deception, bribery, biased evaluation. For violation of academic integrity, students are brought to the following academic responsibility: re-assessment of the relevant type of educational work

More detailed information about competencies, learning outcomes, teaching methods, assessment forms, independent training is given in the Syllabus (working plan) of the educational discipline.

Syllabus approved at the meeting of the Department «Information Systems». Protocol №17 from June 10, 2022.