Syllabus of the course
"*Distributed and parallel computing*"

Specialty	*121 Software engineering*
Study Programme	*Software engineering*
Study cycle (Bachelor, Master, PhD)	*the first (Bachelor) level of higher education*
Course status	*mandatory*
Language	*English*
Term	*fourth year, seventh semester*
ECTS credits	*5*
Workload	*Lectures - 24 hours.*
	Laboratory studies - 24 hours.
	Self-study - 102 hours.
Assessment system	*Grading including Exam*
Department	*Department of Information Systems, auditorium 413 of the main building, phone: (057) 702-18-31, website: http://www.is.hneu.edu.ua/*
Teaching staff	*Minukhin Serhii, professor*
Contacts	*serhii.minukhin@hneu.net*
Course schedule	*Lectures: according to the schedule* *Practical studies:: according to the schedule*
Consultations	*At the Department of Information Systems, offline, according to the schedule, individual, PNS chat.*

Learning objectives and skills:

formation of a system of theoretical knowledge and acquisition of practical skills and abilities in the use of ROS technologies, installation and configuration of appropriate software for launching and executing tasks on a computing cluster and the use of technologies and parallel programming tools based on OpenMP and MPI standards in solving mathematical and engineering problems.

Structural and logical scheme of the course

Prerequisites	Post-requisites
Programming	Diploma project
Operating Systems	
The architecture of computers and computer networks	
Algorithms and data structures	
Discrete mathematics	

Course content

Content module 1. *Technologies of distributed systems.*

Topic 1. Introduction. Basic concepts and classification of distributed computing systems (DCS). Classification of grid systems. Composition and purpose of the levels of Open Grid Service Architecture.

Topic 2. Principles of organization of data processing in distributed systems. The concept and composition of middleware of grid systems of DCS (on the example of a Grid System).

Topic 3: OGSA architecture for DCS. Concept and classification of resource management systems. The concept and types of resource brokers. Task schedulers. Local resource management systems.

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

Topic 5. Principles of operation and organization of monitoring systems in DCS.

Content module 2. *Technologies of parallel computing*

Topic 6. Concept and classification of parallel computer systems (PCS). Multiprocessor and multi-computer systems. Classification of PSC: Flynn, Gustavson. Principles of organization of PWS work.

Topic 7. Models of parallel programming.

Topic 8. Execution of multithreaded programs in the OS.

Topic 9. Parallel programming based on OpenMP.

Topic 10. Parallel programming based on MPI.

Teaching environment (software)

OS Windows 11(10), VM VirtualBox, Internet

Assessment system

Assessment of students' learning outcomes is carried out by the University according to the cumulative 100-point system.

Current control is carried out during lectures and practical (seminar) classes and aims to assess the level of students' readiness to perform particular tasks, and is assessed by the amount of scored points. The maximum amount during the semester – 60 points; the minimum amount required is 35 points.

Final control is carried out at the end of the semester in the form of an exam (the maximum amount is 40 points, the minimum amount required is 25 points).

Current control includes the following assessment methods: assignments on a particular topic; testing; presentations, and essay writing.

More detailed information on assessment and grading system is given in the technological card of the course.

Course policies

Teaching of the academic discipline is based on the principles of academic integrity.

Violation of academic integrity includes academic plagiarism, fabrication, falsification, cheating, deception, bribery, and biased assessment.

Educational students may be brought to the following academic responsibility for breach of academic integrity: repeated assessment of the corresponding type of learning activity.