

Computer Architecture Fundamentals and Operating Systems

COURSE SYLLABUS

Code and name of specialty	121 – Software Engineering	Institute	Computer Sciences and Software Engineering
Program name	Software Engineering	Department	Software Engineering and Management Information Technologies
Type of program	Educational and Professional	Language of instruction	Ukrainian, English

LECTURER

Smolin Pavlo

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Senior Lecturer of Software Engineering and Management Information Technologies Department. Prepared and published 14 research papers and textbooks (h-index = 1, i10-index = 0, Google Scholar - <https://scholar.google.com/citations?user=zCHB-xoAAAAJ&hl%20google%20scholar>; ORCID-<https://orcid.org/0000-0002-1290-9698>, Scopus - <https://www.scopus.com/authid/detail.uri?authorId=57211429421>).

Leading lecturer of the courses: *Operating System (Bachelors, Ukrainian and English), Computer architecture fundamentals and operating systems (Bachelors, Ukrainian and English)*

GENERAL DESCRIPTION OF THE COURSE

Summary	The course “Operating System” is a course in the cycle of professional compulsory training of the specialty 126 “Information Systems and Technologies”. It is taught in the second semester in the amount of 120 hours (4 ECTS credits), in particular: lectures – 32 hours, laboratory classes – 32 hours, independent work – 56 hours. The course includes two content modules and one tests. The study of the discipline ends with the test.				
Course objectives	Assimilation of theoretical bases of construction, principles of design, configuration and application of various modern operating systems which provide the organization of computer processes in corporate information systems and practical application of system calls in software applications				
Types of classes and control	Lectures, laboratory works, control works, self-study. The course ends with a final test				
Term	2				

Student workload (credits) / Type of course	4 / Mandatory	Lectures (hours)	32	Workshops (hours)	32	Self-study (hours)	56
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Program competences	GC05. Ability to learn and master modern knowledge. GC06. Ability to search, process and analyze information from various sources.
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Learning outcomes	Teaching and learning methods	Forms of assessment (continuous assessment CAS, final assessment FAS)
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PO01. Analyze, purposefully search for and select the necessary information and reference resources and knowledge to solve professional problems, taking into account modern advances in science and technology.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, project training	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), express surveys (CAS), online tests (CAS), final / semester control in the form of a semester test, according to the learning process schedule (FAS)
PO07. Know and apply in practice the fundamental concepts, paradigms and basic principles of operation of language, tools and computing software engineering.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), express surveys (CAS), online tests (CAS), final / semester control in the form of a semester test, according to the learning process schedule (FAS)
PO18. Know and be able to apply information technology processing, storage and transmission of data.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, project training	Written individual assignments for laboratory work (CAS), express surveys (CAS), online tests (CAS), final / semester control in the form of a semester test, according to the learning process schedule (FAS)

ASSESSMENT AND GRADING

Ranges of points corresponding to grades	Total score (points) for all types of learning activities	ECTS grading scale	The national grading scale	Allocation of grade points
	90-100	A	excellent	
	82-89	B	good	
	74-81	C	satisfactory	
	64-73	D		
	60-63	E	Unsatisfactory (with the exam retake option)	
	35-59	FX		
	0-34	F	Unsatisfactory (with mandatory repetition of the course)	

100% **final assessment** in the form of test (20%) and current assessment (80%).
20% **exam**: semester test, according to the schedule of the educational process
80% **continuous assessment**:
• 70% assessment of tasks in laboratory work;
• 10% intermediate control (1 control works)

Course policy Follow the rules of the University internal regulations. Take an active part in the learning process. Students must attend all classes according to the study schedule and adhere to the norms of academic ethics. To study the course, students need to have their personal computer and (or) use computers of the computer center at the department. Students must work with compulsory and recommended reading, including Internet resources. Students must complete and submit all laboratory works during the semester in which the course is taught, before the examination session. The final assessment is not carried out without the personal presence of students.

COURSE STRUCTURE AND CONTENT

Topic	Content	Laboratory work	Self-Study
Topic 1	Operating system architecture	Laboratory work 1	Initial information about working with Linux. Working with files in UNIX / Linux
Topic 2	Processes and threads management	Laboratory work 2	Creating and compiling programs in Linux
Topic 3	Processes and threads planning	Laboratory work 3	Transfer command line parameters to the program. Working with processes. Obtaining system information.

Individual work
Individual calculation task.
Studying the topics of the course with the help of recommended literature, homework

Topic 4	Communication of threads	Laboratory work 4	Background processes and signals	
Topic 5	Interprocess Communication	Laboratory work 5	Application of thread	
Topic 6	Memory Management	Laboratory work 6	Linux API - introduction to interprocess interaction. Channels.	
Topic 7	Control of I/O devices	Laboratory work 7	Linux AP - introduction to interprocess interaction. Sockets	
Topic 8	File system	Laboratory work 8		
Topic 9	Network, multiprocessor operating systems and information security	Laboratory work 9		

RECOMMENDED READING

- 1 Шеховцов, В. А. (2005). Операционные системы. Київ: Видавнича група ВНУ.
- 2 Таненбаум, Э., Бос, Х. (2015). Современные операционные системы. 4-е изд. Санкт-Петербург: Питер.
- 3 Олифер, В. Г., Олифер, Н. А. (2002). Сетевые операционные системы. Санкт-Петербург: Питер.
- 4 Гордеев, А. В. (2007). Операционные системы: Учебник для вузов. (2-е изд.). Санкт-Петербург: Питер.
- 5 Назаров, С. В., Широков, А. И. (2012). Современные операционные системы: учебное пособие. Москва: Национальный Открытый Университет «ИНТУИТ».
- 6 Дейтел, Х. М., Чофнес, Д. Р. (2016). Операционные системы. Основы и принципы. Т. 1. Москва: Бинوم.
- 7 Дейтел, Х. М., Дейтел, П. Д., Чофнес, Д. Р. (2013). Операционные системы. Т. 2. Распределенные системы, сети, безопасность. Москва: Бином.
- 8 Бовет, Д., Чезати, М. (2007). Ядро Linux. Санкт-Петербург: БХВ-Петербург.
- 9 Арпачи-Дюссо, Р. Х., Арпачи-Дюссо, А. К. (2021). Операционные системы: Три простых элемента. Москва: ДМК Пресс.
- 10 Столлингс Вильям (2020). Операционные системы. Внутренняя структура и принципы проектирования. Диалектика.

- 1 Руссинович, М., Соломон Д. (2003). Внутренне устройство Microsoft Windows: Windows Server 2003, Windows XP и Windows 2000. Мастер класс. Москва: Издательско-торговый дом "Русская Редакция".
- 2 Саймон, Р. (2004). Windows 2003 API. Энциклопедия программиста. Киев: ООО "ДиасофтЮП".
- 3 Побегайло, А. П. (2006). Системное программирование в Windows. Санкт-Петербург: БХВ-Петербург.
- 4 Бэкон Дж., Харрис, Т. (2004). Операционные системы. Киев: Издат. группа ВНУ; Санкт-Петербург: Питер.
- 5 Кокорева, О. И. (2004). Реестр Windows. Санкт-Петербург: БХВ-Петербург.
- 6 Голубничий, Д. Ю., Третьяк В. Ф. (2004). Системне програмування і операційні системи : навч. посібн. Ч.1. Харків: Вид. ХДЕУ.
- 7 Голубничий, Д. Ю., Третьяк В. Ф., Кавун С. В. (2005). Системне програмування та операційні системи : навч. посібн. Ч. 2. Харків: Вид. ХНЕУ.
- 8 Сорокина, С. И., Тихонов, А. Ю., Щербаков А. Ю. (2003). Программирование драйверов и систем безопасности : учебн. пособ. Санкт-Петербург: БХВ-Петербург.
- 9 Попов, А. В. (2009). Введение в Windows PowerShell. Санкт-Петербург: БХВ-Петербург.
- 10 Джонсон, М., Троян, Э. (2007). Разработка приложений в среде Linux. Москва: ООО "И. Д. Вильямс".
11. Иванов, Л. В. Основы програмування (частина 1). Retrieved from http://www.iwanoff.inf.ua/programming_2_ua/index.html

ACADEMIC INTEGRITY

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.