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| Discipline „Operating Systems Principles”, code: 27 |
| Annotation:  The course examines the principles of organization and operation of the operating systems. Different issues related to the operation of different core subsystems of modern OSs such as: Process and Thread Management Subsystem, Memory Management Subsystem, Input / Output Management Subsystem, Interrupt System, Network Subsystem, Resource Management, file subsystem and more are discussed. Emphasis is placed on the specifics of the OS work on multiprocessor and multi-computer architectures, methods of protecting programs and data, building virtual environments, features and requirements of OS for mobile devices, etc. The principles of parallel and distributed programming are given, issues of synchronization of parallel processes and threads and prevention of mutual deadlock are discussed. |
| Main issues of the syllabus content:   * Operating systems - basic concepts. Requirements to the OS. Development of the OS * Structure of the OS. Functions of the OS. System calls. * Creating executable programs. Linkers. Loading programs. * Processes. Process states. * Switching the context of processes. Basic operations on processes. * Process synchronization. Critical section. Mutual-exclusive access. * Programming solutions for mutually exclusive access. Algorithms of Decker and Peterson. * Semaphores. Basic operations on semaphores. Solution of the "Producer-Consumer" problem. * Monitors. Graph of process states in the monitor. * Processes scheduling. Criteria. Scheduler. * Algorithms for process scheduling. Algorithms with preemption and without preemption. * Scheduling strategies: First-Come-First-Serve, Shortest-Job-First, Shortest-Remaining-Time-First, Round-Robin, Multi-level Queues. * Memory management. Static and dynamic address linking. Logical and physical addresses. * Continuous organization of the memory. * Paged organization of the memory. * Segmented organization of the memory * Page swapping. Replacement strategies. * File system. Files and operations on them. Access methods. * Directory Structure. Organization. Access control. |