GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Operating Systems, PG_00038298 | | |
| Field of study | Automation, Robotics and Control Systems | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2025/2026 |
| Education level | second-cycle studies | Subject group | Specialty subject group<br>Subject group related to scientific research in the field of study |
| Mode of study | Part-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | Polish |
| Semester of study | 2 | ECTS credits | 2.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department of Control Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Robert Smyk | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 10.0 | 0.0 | 10.0 | 0.0 | 0.0 | 20 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 20 | 4.0 | 26.0 | 50 |

**Subject objectives**

The aim of the course is to introduce students to the fundamentals of **Linux system administration**, including user and process management as well as data processing in a system environment. During the course, students learn how to use key system tools for searching and processing data, such as **grep, awk, sed, and find**, and gain basic skills in **Bash scripting** for automating administrative tasks.

The course also introduces mechanisms for managing system resources and the fundamentals of **application containerization**. Students learn the principles of creating, configuring, and managing **Docker containers**, and practice using system tools and scripts to automate tasks in the Linux environment.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W02] has a structured knowledge of the application of information systems to improve the reliability, efficiency, speed and mobility of control and management systems | knows the role of the operating system as computer resource management software, it understands the functions of the basic modules included in the operating system | [SW2] Assessment of knowledge contained in presentation |
| [K7_U12] can program and implement network applications with typical protocols | uses the basic utilities available in text mode and graphics mode to configure and administer the operating system | [SU1] Assessment of task fulfilment |

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| Subject contents | Course content – lecture<br><br>1. **Fundamentals of Operating Systems structure, functions, and resource management mechanisms.**<br>2. **Linux System Administration user, process, and permission management.**<br>3. **Data Processing data search and manipulation tools (grep, awk, sed, find).**<br>4. **Bash Programming scripting for task automation.**<br>5. **System Management resource monitoring, file handling, task scheduling.**<br>6. **Containerization basics of Docker, container management and deployment.**<br>7. **Automation and Optimization efficient system management and administrative scripting.** |
| | Course content – laboratory<br><br>Laboratory Course Content<br><br>• **Introduction to working in the Linux environment** logging into the system, navigating the directory structure, and performing basic file and directory operations using command-line tools.<br>• **User and permission management** creating and modifying user accounts, managing groups, and configuring file and directory access permissions.<br>• **Process and resource management** running and controlling processes, monitoring system resources, and using basic administrative tools.<br>• **Data processing in Linux** practical use of tools such as *grep, awk, sed,* and *find* for searching, filtering, and processing data.<br>• **Bash scripting** writing and executing Bash scripts, automating administrative tasks, and performing operations on files and data.<br>• **System task management** scheduling and automating system tasks using built-in Linux mechanisms.<br>• **Application containerization** installation and configuration of the Docker environment, creating container images, and running containers.<br>• **Working with Docker containers** building and running applications in containers, managing container resources, and basic deployment of applications in a containerized environment.<br>• **Automation of administrative tasks** using Bash scripts and system tools to automate routine tasks in the Linux environment. |
| Prerequisites and co-requisites | Knowledge of basic concepts and skills acquired during the computer science course. Basic knowledge of programming. |
| Assessment methods and criteria | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Rating of individual work during exercise | 60.0% | 20.0% |
| Periodic Reporting | 60.0% | 80.0% |

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| Recommended reading | Basic literature | 1. A. Silberschatz, P. B. Galvin, Podstawy systemów operacyjnych, WNT, Warszawa 2006.<br>2. A. S. Tanenbaum, Systemy operacyjne. Wyd. 3, Helion, Gliwice 2010.<br>3. W. Stallings, Systemy operacyjne. Struktura i zasady budowy, PWN, Warszawa 2006.<br>4. K. Stencel, Systemy operacyjne, Wydawnictwo PJWSTK, Warszawa 2004.<br>5. K. Lal, T. Rak, Linux. Komendy i polecenia. Praktyczne przykłady, Helion, Gliwice 2010. |
| | Supplementary literature | 1. Ł. Sosna, Linux. Komendy i polecenia. Wyd. 3, Helion, Gliwice 2010.<br>2. W. Stanisławski, D. Raczyński, Programowanie systemowe mikroprocesorów rodziny x86, PWN, Warszawa 2010.<br>3. B. Goodheart, J. Cox, Sekrety magicznego ogrodu. UNIX System V Wersja 4 od środka. Podręcznik, WNT, Warszawa 2001. |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | Understanding the principles of working in the Linux command line.<br><br>Preparation of the basic configuration.<br><br>Basics of Linux firewall configuration.<br><br>Administration and management of the basic system services. | |
| Practical activites within the subject | Not applicable | |

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