# Politehnica University of Bucharest

# Faculty of Electronics, Telecommunications and Information Technology

**COURSE DESCRIPTION**

**1. Program identification information**

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| 1.1 Higher education institution | POLITEHNICA University of Bucharest |
| 1.2 Faculty | Electronics, Telecommunications, Information Technology |
| 1.3 Department | Applied Electronics and Information Engineering |
| 1.4 Domain of studies | Computers and Information Technology |
| 1.5 Cycle of studies | Bachelor of Science |
| 1.6 Program of studies | Information Engineering |

**2. Course identification information**

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| 2.1 Name of the course | | | | Operating Systems | | | |
| 2.2 Lecturer | | | | Stefan Stancescu | | | |
| 2.3 Instructor for practical activities | | | | Catalin Sandu | | | |
| 2.4 Year of studies | 3 | 2.5 Semester | 2 | 2.6 Evaluation type | Verification | 2.7 Course choice type | Mandatory |

**3. Total estimated time** (hours per semester for academic activities)

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| 3.1 Number of hours per week, out of which | 3 | | 3.2 course | 2 | 3.3 practical activities | | 1 |
| 3.4 Total hours in the curricula, out of which | 42 | | 3.5 course | 28 | 3.6 practical activities | | 14 |
| Distribution of time | | | | | | | hours |
| Study according to the manual, course support, bibliography and hand notes | | | | | | | 15 |
| Supplemental documentation (library, electronic access resources, in the field, etc) | | | | | | | 20 |
| Preparation for practical activities, homework, essays, portfolios, etc. | | | | | | | 30 |
| Tutoring | | | | | | |  |
| Examinations | | | | | | | 10 |
| Other activities | | | | | | |  |
| 3.7 Total hours of individual study | | 75 | | | |  |  |
| 3.9 Total hours per semester | | 117 | | | |  |  |
| 3. 10 Number of ECTS credit points | | 2 | | | |  |  |

**4. Prerequisites (if applicable)**

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| 4.1 curricular | Computer System Architecture, Microprocessor Architecture |
| 4.2 competence-based | Basic programming abilities in usual language |

**5. Requisites (if applicable)**

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| 5.1 for running the course | Internet, projector |
| 5.2 for running of the applications | Mandatory presence at laboratories (according to the regulations of PUB) |

**6. Specific competences**

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| Professional competences | C3.1. C3.2 C3.5 The study of structure, role, interaction, operation and evaluation for system software of computer systems, embedded systems working in real time included. C4.1 C4.2 C4.3 C4.5 The study of system software structure for electronic equipments, embedded systems included, algorithms explaining the OS operation, competence on Linux OS. |
| Transversal  competences | CT1 and CT3 Tracking logic discovery of methods for solving problems by modeling the computing system behavior builds a rational, orderly knowledge and respect for laws and social conventions, thus ensuring positive social behavior in the fulfillment of professional duties. |

**7. Course objectives (as implied by the grid of specific competences)**

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| 7.1 General objective of the course | Discipline aims to study system programs in computer systems |
| 4.2 Specific objectives | Management mechanisms knowledge of computing resources (processes management and communication mechanisms between processes, memory, input / output and file management); system utilities (structure and functions) as tools for development of applications in computer systems. |

**8. Content**

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| 8.1 Lectures | | Teaching techniques | | Remarks |
| 1.Definitions, concepts, general structure of an operating system in a computer system, the software features of the system, features, classifications, history | | Ppt presentation on projector | | 2 hours |
| 2.Assembly, directives, object files formats, the construction of a 2 pass assembler | | Ppt presentation on projector | | 3 hours |
| 3. Relocatability. Linkers, building a 2 passes linker. Dynamic linking. Loaders. Bootstrappers. | | Ppt presentation on projector | | 3 hours |
| 4.Macroprocessors. Libraries. | | Ppt presentation on projector | | 2 hours |
| 5. Compilers: BNF, lexical analysis, syntactic analysis, semantic programs, code generation. | | Ppt presentation on projector | | 4 hours |
| 6. Interprocess communications, mutual exclusion, semaphores, monitors, equivalences. | | Ppt presentation on projector | | 2 hours |
| 7. Process management, tasks, threads, interlocking, scheduling algorithms | | Ppt presentation on projector | | 4 hours |
| 8. I/O management: interruption management, device drivers, resource planning, I/O deadlock. | | Ppt presentation on projector | | 2 hours |
| 9. Memory management, sharing memory, memory space management and allocation algorithms, virtual memory, paging algorithms, allocation and deallocation of pages, working set. | | Ppt presentation on projector | | 3 hours |
| 10. External memory space management, file system structures and management | | Ppt presentation on projector | | 3 hours |
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| Bibliography  [1]Andrew Tanenbaum, Albert S. Woodhool “Operating Systems. Design and Implementation" , 3'rd edition, Prentice Hall, 2006  [2]Andrew Tanenbaum, Modern Operating Systems 3'rd edition, Pearson Education Inc., 2008  [3]A.Silberschatz, P. B. Galvin, G. Gagne, Operating System Concepts, John Wiley & Sons, Inc, 2009, 8'th ed.  [4]Stefan Stancescu, http://stst.elia.pub.ro/programa/soIII.htm | | | | |
| 8.2 Practical applications | Teaching techniques | | Remarks | |
| 1.Introduction to LINUX operating system | Work at Linux station | | 2 hours | |
| 2.Command interpreter | Work at Linux station | | 2 hours | |
| 3.C programming in Linux | Work at Linux station | | 2 hours | |
| 4.Linux system programming | Work at Linux station | | 2 hours | |
| 5.Linux kernel programming | Work at Linux station | | 2 hours | |
| 6.Linux parsing tools | Work at Linux station | | 2 hours | |
| 7.Final Colloquium | Work at Linux station | | 2 hours | |
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**9. Bridging the course content with the expectations of the epistemic community representatives, professional associations and employers representatives for the domain of the program**

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| The industry has a strong demand for qualified engineers with specializations related to the use of computers and the development of software applications, which require detailed knowledge of the hardware/software interaction; the actual development of complex dedicated systems, communications equipment or mobile included, presume mandatory an operating system as resource management integrated into the system; development of dedicated applications requires knowledge of all the details of the processes in program execution, development of systems intimately with the structure of electronics, designing of simulation and development systems. The course syllabus meets these concrete actual requirements of technology development and evolution, subscribed to Europe 2020 plan, in Electronic Engineering domain. In the context of actual IT fast progress, the course areas are targeted to all aspects of economic and social life in aim to move towards the knowledge society in which human experience is outsourced in independent systems dedicated to areas ranging from system utilities in telecommunications, military, field security (surveillance systems), industrial automation (inspection systems products), robotics (human-machine interface systems) and others. This course provides graduates with appropriate skills and training needs of current scientific qualifications and modern quality and competitive technique, allowing them rapid employment after graduation. Perfectly framed with the POLITEHNICA University of Bucharest policy, both in terms of content and structure and in terms of skills and international openness offered to students. |

**10. Evaluation**

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| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Weight in the final mark |
| 10.4 Lectures | Knowledge of fundamental theoretical concepts;- Knowledge of how to apply the theory to specific problems. | Written test verification over the entire field, mainly exercises and problems | 50 |
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| 10.5Technical essays | Differential analysis of techniques and theoretical methods; perspectives. | Written essay upon a agreed lecture subject covering last issues on theme | 20 |
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| 10.6Practical applications | Knowledge of how to apply the theory to specific problems. | Laboratory work on Linux OS | 30 |
| 10.7 Minimal performance standard | | | |
| Course achievement proven by obtaining at least 50% of each score | | | |

Date Lecturer Instructor for practical activities

10.10.2015 Conf. dr. ing. Stefan Stancescu Drd. Catalin Sandu

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Date of department approval Director of Department,

10.12.2015 Prof. Dr. Ing. S. Paşca

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