# 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 | | | | Software Engineering | | | |
| 2.2 Lecturer | | | | Stefan Stancescu | | | |
| 2.3 Instructor for practical activities | | | | Catalin Sandu | | | |
| 2.4 Year of studies | 4 | 2.5 Semester | 1 | 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, homeworks, 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 Programming, Data Structures and Algorithms, Object Orientated Programming |
| 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.C 3.2 C3.5 Study of programming paradigms concepts, engineering tools and methods dedicated to design information systems, the development and implementation of software solutions for electronic hardware  C4.1 C4.2 C4.3 C4.5 Technologies and concepts descriptions in software development, methods and tools in development and design of specifications, analysis, design, implementation and integration of software solutions, software lifecycle management of electronic systems |
| 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 | The study of engineering methods to solve real problems by developing dedicated applications software products, methods, processes and other software tools made available by organized problem-solving experience with software development. |
| 4.2 Specific objectives | Methods, mechanisms and processes in system analysis, requirements definition, requirements specification, design and implementation of complex applications using computer aided design in view to increase productivity in development, implementation and maintenance of adequate, reliable, maintainable and reusable complex software products |

**8. Content**

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| 8.1 Lectures | | Teaching techniques | | Remarks |
| 1.Introduction to engineering, software engineering, software engineering necessity, history, definitions | | Ppt presentation on projector | | 2 hours |
| 2. Engineering design, SW design cycle, specificity of software design. Life cycles of software models, problem solver patterns. | | Ppt presentation on projector | | 2 hours |
| 3. System analysis, requirements definition, formal levels in requirements specification, requirements documentation, requirements evolution, requirements specification steps, requirements definition and requirements specification forms | | Ppt presentation on projector | | 4 hours |
| 4. System modeling, system context, point of view analysis, system software model description, functional and objectual modeling. | | Ppt presentation on projector | | 4 hours |
| 5. Software design. Structural design: definitions, structure theorem, elementary components, basic control structures. Program presentation paradigms. Program refinement. | | Ppt presentation on projector | | 2 hours |
| 6. Functional programming: data flux diagrams, structure diagrams, data dictionary, data structure synthesis | | Ppt presentation on projector | | 2 hours |
| 7. Objectual modeling. UML as modeling language | | Ppt presentation on projector | | 4 hours |
| 8. User interface design recommendations. Software team management. Programming style. | | Ppt presentation on projector | | 2 hours |
| 9. Software implementation, verification, validation | | Ppt presentation on projector | | 2 hours |
| 10. Software complexity, software quality, software design quality, software metrics. Reusable software design. | | Ppt presentation on projector | | 4 hours |
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| Bibliography  [1] A. Sommerville – “Software engineering”, ed. VIII, Addison Wesley, 2007  [2] Stefan Stancescu - Note de curs, <http://stst.elia.pub.ro/programa/is.htm> | | | | |
| 8.2 Practical applications | Teaching techniques | | Remarks | |
| Introducere in UML. | Work at integrated station | | 2 hours | |
| Diagrame UML de clase | Work at integrated station | | 2 hours | |
| Diagrame UML de tip activitate | Work at integrated station | | 2 hours | |
| Diagrame UML de stare | Work at integrated station | | 2 hours | |
| Diagrame UML de interacţiune | Work at integrated station | | 2 hours | |
| Diagrame UML „use case” | Work at integrated station | | 2 hours | |
| Colocviu final de laborator | Work at integrated 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 abilities to design and implement complex information systems; development of dedicated applications requires knowledge of all the details of the processes spanned over all the software product lifecycle, from the first user contact in requirement description, through software development – system analysis, requirements specifications, system and component design, implementation, integration, verification, validation, operation and certification - of a quality, reliable and reusable software product.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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