**COURSE DESCRIPTION**

**1. Program identification information**

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| 1.1 Higher education institution | Politehnica University of Bucharest |
| 1.2 Faculty | Faculty of Electronics, Telecommunications and Information Technology |
| 1.3 Department | Dept. of Applied Electronics and Information Engineering |
| 1.4 Domain of studies | Computers and Information Technology |
| 1.5 Cycle of studies | Licence (engineering) |
| 1.6 Program of studies/Qualification | Information Engineering |

**2. Course identification information**

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| 2.1 Name of the course | Computer Programming (PC) |
| 2.2 Lecturer | Assoc. Prof. Dr. Eng. Bogdan Ionescu |
| 2.3 Instructor for practical activities | Assoc. Prof. Dr. Eng. Bogdan Ionescu Dr. Eng. Ionuț Mironică |
| 2.4 Year of studies | I | 2.5 Semester | 1 | 2.6 Evaluation type | Exam | 2.7 Course choice type | Compulsory |

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

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| 3.1 Number of hours per week, out of which | 4 | 3.2 course | 2 | 3.3 practical activities | 2 |
| 3.4 Total hours in the curricula, out of which | 56 | 3.5 course | 28 | 3.6 practical activities | 28 |
| Distribution of time | hours |
| Study according to the manual, course support, bibliography and hand notes | 20 |
| Supplemental documentation (library, electronic access resources, in the field, etc) | 20 |
| Preparation for practical activities, homeworks, essays, portfolios, etc. | 5 |
| Tutoring | 0 |
| Examinations | 3 |
| Other activities | 0 |
| 3.7 Total hours of individual study | 48 |  |  |
| 3.9 Total hours per semester | 104 |  |  |
| 3. 10 Number of ECTS credit points | 4 |  |  |

**4. Prerequisites (if applicable)**

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| 4.1 curricular | Not applicable. |
| 4.2 competence-based | Not applicable. |

**5. Requisites (if applicable)**

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| 5.1 for running the course | Not applicable. |
| 5.2 for running of the applications | Compulsory presence at laboratory classes, according to current PUB regulations. |

**6. Specific competences**

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| Professional competences | C1 Operating with scientific, engineering and computer science fundamentals;C3 Solving engineering problems using computer science;C4 Use of programming environments and technologies. |
| Transversalcompetences | - |

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

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| 7.1 General objective of the course | *Course:* during the first part of the lectures the students study structured programming general principles based on the knowledge and understanding of computer structure and operation. During the second part fundamentals of C programming are explained. The C programming language is presented in a gradual manner. All essential C particularities are examined (data organization, instructions, arrays, functions, pointers).*Applications:* fundamental C programming language usage practice is exercised. Applications exercise both elementary syntactic constructions and basic programs’ conception. Problems with different levels of difficulty are solved and analyzed. Multiple solutions for same problem are identified and efficiency issues are discussed. Typical errors are also pointed out. |
| 4.2 Specific objectives | The main purpose of this subject is to develop the student abilities to develop C programs by pursuing the following stages: in-depth and complete subject understanding, choosing/developing the appropriate algorithm and writing down the entire code using the high-level programming language. |

**8. Content**

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| 8.1 Lectures | Teaching techniques | Remarks |
| Introduction - computational systems and programming languages: computational systems architecture; hardware / software; programming languages; program developing steps; algorithm concept. | Teaching is carried out using video facilities. During classes, a permanent interaction between students and professor is maintained. Students are stimulated to develop solutions and discuss various programming exercises thus stimulating their creativity. Course materials consist of class notes, class bibliography and the platforms for the practical applications. All the materials are available to students on the course website.  | 6 hours |
| C fundamentals: C specificity; creating, compiling and executing C programs; C program structure; variables, constants; data types; operators and expressions; in/out operations; practical examples and applications. | 6 hours |
| Conditional and repetitive structures: conditional statements and operators (if-else, switch-case, ?:); repetitive statements (while, do-while, for); break and continue; practical examples and applications. | 4 hours |
| Complex data types: matrices; strings; structures and unions; practical examples and applications. | 4 hours |
| Functions: fundamentals; defining and calling functions, prototypes; recurrence; practical examples and applications. | 6 hours |
| Pointer and data files: defining and working with pointes; working with data files; practical examples and applications. | 2 hours |
| Bibliography- B. Ionescu, Class notes on Computer Programming, UPB, ETTI-EAII, LAPI – The Image Processing and Analysis Laboratory, <http://imag.pub.ro/~bionescu/index_files/Page328.htm>;- C++, <http://www.cplusplus.com> (last accessed 2015);- C. Dan, D. Burileanu, “Introducere în programarea calculatoarelor. Limbajul C”, Printech, Bucharest, 2001.- D. Burileanu, C. Dan, M. Pădure, “Programare în C. Culegere de probleme”, Printech, Bucharest, 2004.- I. Rusu, D. Gavrilescu, V. Grosu, “Programarea calculatoarelor în limbaj C”, MATRIX ROM, Bucharest, 2002.- I. Rusu, D. Gavrilescu, V. Grosu, “Îndrumar de laborator pentru programarea calculatoarelor”, MATRIX ROM, Bucharest, 2004.- D.I. Năstac, “Programarea calculatoarelor în limbajul C – Elemente fundamentale”, Printech, Bucharest, 2006.- A. Bacivarov, D.I. Năstac, “Limbaje de programare – Limbajul C. Îndrumar de laborator”, UPB Printing House, 1997. |
| 8.2 Practical applications | Teaching techniques | Remarks |
| Presentation of the C programming environment; editing, compiling, executing the programs;  | The practical applications are carried out individually by each student. Each student has access to a fully equiped PC machine. Programming is carried out using the Dev-C++ environment. Students have to study the materials prior to each of the practical sessions. | 2 hours |
| Simple programs, working with variables and constants, in-out operations; | 2 hours |
| Basic data types, operators and expressions; | 2 hours |
| Conditional statements: decision and selection; | 2 hours |
| Initial test loops, final test loops and counter loops; | 4 hours |
| Mid-term exam; | 2 hours |
| Data arrays and strings, structures, unions and enumerations; | 4 hours |
| Functions and recursion; | 4 hours |
| Basic pointer operations; | 2 hours |
| Review of the concepts and problems; | 2 hours |
| Final exam.  | 2 hours |
| Bibliography- D. Burileanu, C. Dan, M. Pădure, “Programarea Calculatoarelor - Laborator”, available in the laboratory in hard copy as well as in electronic format, 2008;- course bibliography. |

**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 course provides the graduates with the fundamentals on computational systems and C programming. The current technological progress of electronic and telecommunication devices is conditioned by the ability of the engineers to develop and experiment new technologies with the help of computer programming. Therefore, computer programming plays a critical part in the training of the future generation of engineers that will foster new technologies in the field. |

**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 the C language fundamentals and theoretical notions from the course;-solving computation problems using the C language; | Written examination at the end of the semester. Topics cover the entire course bibliography as well as the practical aspects of programming in C; | 50% |
| 10.5 Practical applications | - attendance to the application sessions; | - finalizing each practical session tasks; | 10% |
| -solving various computation problems using the C language; | - practical evaluation; | 20% |
| - practical evaluation at the end of the semester; | 20% |
| 10.6 Minimal performance standard |
| * attendance to the practical application sessions;
* validating the applications by achieving at least 50% of the allotted points;
* accumulating in total at least 50 points from 100 (applications and final examination).
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Date Lecturer Instructor for practical activities

15.09.2015 Assoc.Prof. Dr. Eng. B. Ionescu Assoc.Prof. Dr. Eng. B. Ionescu

 Dr. Eng. I. Mironică

Date of department approval Director of Department,

15.09.2015 Prof. Dr. Eng. S. Paşca