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| O imagine care conține siglă, simbol, Font, Grafică  Descriere generată automat | MINISTERUL EDUCAŢIEI **UNIVERSITATEA „AUREL VLAICU“ DIN ARAD**310130 Arad, B-dul Revolutiei nr. 77, P.O. BOX 2/158 AR *Tel.: 0040-257- 283010; fax. 0040-257- 280070*  [http://www.uav.ro](http://www.uav-arad.go.ro)*;* e-mail: rectorat@uav.ro |

**Operator de date cu caracter personal nr. 2929**

**SYLLABUS**

1. **Study programme**

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| 1.1. Higher education institution | **„Aurel Vlaicu” University of Arad** |
| 1.2. Faculty | **of Exact Sciences** |
| 1.3. Department | **Department of Mathematics and Computer Science** |
| 1.4. Field of study | **Mathematics** |
| 1.5. Study level | **2024-2025** |
| 1.6. Study cycle | **Bachelor** |
| 1.7. Study programme / Qualification | **Mathematics-Computer Science** |
| 1.8. Form of education | **Full – Time study** |

1. **Course details**

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| 2.1. Name of the course | **GlCF1O04 Algorithms and Programming 1** |
| 2.2. Course coordinator | **PhD. Crăciun Mihaela-Daciana** |
| 2.3. Seminar/laboratory/project coordinator | **PhD. Crăciun Mihaela-Daciana** |
| 2.4. Study year | **1** |
| 2.5. Semester | **1** |
| 2.6. Evaluation type | **EN** |
| 2.7. Course type | **Ob** |

1. **Estimated total time (hours per semester)**

|  |  |
| --- | --- |
| 3.1. Hours per week | **3** |
| 3.2. Lecture hours per week | **2** |
| 3.3. Seminar/laboratory/project hours per week | **1** |
| 3.4. Total hours per curriculum | **42** |
| 3.5. Lecture hours per semester | **28** |
| 3.6. Seminar/laboratory/project hours per semester | **14** |
| Time division [hrs] | |
| 3.4.1. Independent study from textbooks, course support, bibliography and notes | **23** |
| 3.4.2. Additional reading (libraries, specialized electronic platforms and field research) | **23** |
| 3.4.3. Preparing of seminars/laboratories/projects, homework, papers, portfolios and essays | **23** |
| 3.4.4. Tutorial coaching | **10** |
| 3.4.5. Examinations | **4** |
| 3.4.6. Other activities | **0** |
| 3.7. Total individual study hours | **83** |
| 3.8. Total hours per semester | **125** |
| 3.9. Number of ECTS credits | **5** |

1. **Prerequisites** (if applicable)

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| 4.1. Curriculum related |  |
| 4.2. Competence related |  |

1. **Conditions** (if applicable)

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| 5.1. for the lecture | Classroom equipped with laptop, projector and appropriate software. |
| 5.2. for the seminar |  |
| 5.3. for the laboratory | Laboratory room, properly equipped: computers, network, Internet connection, appropriate software. |
| 5.4. for the project |  |

1. **Specific educational objectives (competences to be acquired)**

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| 6.1. Professional competencies | C1. Develops problem-solving strategies  C4. Thinks abstractly  C7. Uses data processing techniques  C15. Use mathematical and computer tools |
| 6.2. Transversal competencies | TC1. Shows initiative  TC3. Takes responsibility  TC4. Works in teams |

1. **Course outcomes (resulting from the specific educational objectives to be acquired)**

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| 7.1. General outcomes | Students learn concepts of procedural programming problems and algorithm design and analysis.  To develop students' ability to correctly apply their acquired knowledge and develop their analytical skills. |
| 7.2. Specific outcomes | Students will be capable:   * Identify the appropriate algorithm for a given problem; * Design, implement and optimize an algorithm as a solution to a given problem; * Perform the complexity calculation for a given algorithm. |

1. **Outline** (if applicable)

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| 8.1 Lecture Outline | Teaching methods | Remarks |
| Introduction to structured and procedural programming | interactive presentation, heuristic conversation, exemplification | 2 hours |
| Data types. Variables | interactive presentation, heuristic conversation, exemplification | 2 hours |
| I/O functions | interactive presentation, heuristic conversation, exemplification | 2 hours |
| Operators. Express | interactive presentation, heuristic conversation, exemplification | 2 hours |
| Instructions: decision, multiple-choice, repetitive, control, jump, callback | interactive presentation, exemplification,  web-based documentation, problematization, modeling | 8 hours |
| Memory boards | interactive presentation, exemplification,  web-based documentation, problematization | 8 hours |
| Functions | interactive presentation, exemplification,  web-based documentation, problematization | 3 hours |
| How to search and sort paintings | interactive presentation, exemplification,  web-based documentation, problematization | 1 hour |
| 8.2 Lecture References   * + 1. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. 2nd ed. Cambridge, MA: MIT Press, 2001. ISBN: 9780262032933 2.     2. D. Knuth, The Art of Computer Programming, Vol.1: Fundamental Algorithms, Teora, 2000     3. M. Sipser, Introduction to the Theory of Computation. 2nd ed. Boston, MA: Course Technology, 2005. ISBN: 9780534950972.     4. K.Jamsa, L. Klander, All About C and C++, Fundamental Handbook of C and C++ Programming, Ed. Teora, 2004     5. V. Iordan, Algoritmi si programare in C, Ed.Eurostampa, 2007  1. Siddhartha Rao, C++ in One Hour a Day, Sams Teach Yourself, Pearson Education (US), 2016    * 1. Subrata Saha, Subhodip Mukherjee, Basic Computation and Programming with C, Cambridge University Press, 2017 | | |

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| 8.3 Seminar Outline | Teaching methods | Remarks |
| 8.4 Seminar References | | |
| 8.5 Laboratory Outline | Teaching methods | Remarks |
| Introduction to the working environment. Compilation | debate, problematization, exercise, application | 1 hour |
| Operator applications. Applications with expressions | debate, problematization, exercise, application | 1 hour |
| Applications for decision and conditional instruction | debate, problematization, exercise, application | 2 hours |
| Apps for repetitive instructions | debate, problematization, exercise, application | 4 hours |
| Applications for memory boards | debate, problematization, exercise, application | 4 hours |
| Function applications. Recursivity | debate, problematization, exercise, application | 2 hours |
| 8.6 Laboratory References   * + 1. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. 2nd ed. Cambridge, MA: MIT Press, 2001. ISBN: 9780262032933 2.     2. D. Knuth, The Art of Computer Programming, Vol.1: Fundamental Algorithms, Teora, 2000     3. M. Sipser, Introduction to the Theory of Computation. 2nd ed. Boston, MA: Course Technology, 2005. ISBN: 9780534950972.     4. K.Jamsa, L. Klander, All About C and C++, Fundamental Handbook of C and C++ Programming, Ed. Teora, 2004     5. V. Iordan, Algoritmi si programare in C, Ed.Eurostampa, 2007     6. Siddhartha Rao, C++ in One Hour a Day, Sams Teach Yourself, Pearson Education (US), 2016     7. Subrata Saha, Subhodip Mukherjee, Basic Computation and Programming with C, Cambridge University Press, 2017 | | |
| 8.7 Project Outline | Teaching methods | Remarks |
| 8.8 Project References | | |

1. Correlation of course outline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

The subject content is in line with the content of similar subjects in other university centers in the country and abroad. In order to better adapt the content of the subject to the requirements of the labor market, meetings were held with both employers - representatives of the business environment and mathematics and computer science teachers from the pre-university education in Arad.

1. **Evaluation / Grading** (if applicable)

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| Activity type | Evaluation criteria | Evaluation methods | Percentage of the final grade |
| 10.1. Lecture | Accuracy and completeness of knowledge. Logical consistency. Degree of assimilation of specialized language. | Oral assessment (final in exam session): -  Presentation of a final project - Student's free exposition - Evaluation conversation - Oral quiz. | 50% |
| 10.2.  Seminar |  |  |  |
| 10.3.  Laboratory | Ability to operate with the knowledge assimilated; Ability to apply in practice | Oral assessment (final in the exam session): - Realization and presentation of the final project | 30% |
| 10.4. Project | Ability to operate with the knowledge assimilated; Ability to apply in practice | Themes, projects realized along the way | 20% |
| 10.5 Minimal performance standard  Learning fundamental concepts, using specialized language, making a simple application. | | | |

Course coordinator

Lect.univ.dr. Mihaela-Daciana CRĂCIUN Seminar/laboratory/project coordinator

Lect.univ.dr. Mihaela-Daciana CRĂCIUN

Head of the Department

Lect.univ.dr. Lorena Camelia POPA

Dean

Prof.univ.dr. Sorin-Florin NĂDĂBAN