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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 | **GlCC6F21 Modeling and Simulation** |
| 2.2. Course coordinator | **PhD. Crăciun Mihaela-Daciana** |
| 2.3. Seminar/laboratory/project coordinator | **PhD. Crăciun Mihaela-Daciana** |
| 2.4. Study year | **3** |
| 2.5. Semester | **2** |
| 2.6. Evaluation type | **ES** |
| 2.7. Course type | **As** |

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

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| 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 | **25** |
| 3.4.2. Additional reading (libraries, specialized electronic platforms and field research) | **25** |
| 3.4.3. Preparing of seminars/laboratories/projects, homework, papers, portfolios and essays | **25** |
| 3.4.4. Tutorial coaching | **4** |
| 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 | Lecture room, equipped with laptop, video projector, Internet connection and appropriate software. |
| 5.2. for the seminar |  |
| 5.3. for the laboratory | Laboratory room with computers and internet access High-level programming language - Matlab. |
| 5.4. for the project |  |

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

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| 6.1. Professional competencies | C2. Mathematical processing of data, analysis of phenomena and processes.  C5. Programming in high level programming languages. |
| 6.2. Transversal competencies | CT1. Applying the rules of organized and efficient work, of responsibie attitudes towards teaching-scientific field, to value the own creative potential, while respecting the principles and norms of professional ethics.  CT2. Efficient conduct of team activities.  CT3. Efficient use of information, communication resources and assisted education both in Roumanian and in an internationally widespread language. |

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

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| 7.1. General outcomes | Familiarization of students with the principles and methods by which the modeling and simulation of systems in general and with the possibility of software implementation of simulators are carried out. |
| 7.2. Specific outcomes | - defining the concepts underlying system modeling and the solutions used for modeling hardware and software systems;  - system modeling in MATLAB-Simulink;  - creative application and interpretation of modeling principles in order to create new models for software or hardware components;  - training the ability to identify, describe and create new modeling solutions for evaluating the performance of computing systems. |

1. **Outline** (if applicable)

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| 8.1 Lecture Outline | Teaching methods | Remarks |
| - Modeling and simulation. Introduction - Brief History - Development of Simulation Models - Advantages & Disadvantages Concepts and Classification  - Basic Concepts of Modeling and Simulation - System State Variables  - Model Classification - Demodeling Process - Verification and Validation Techniques  - Discrete Systems Simulation - Event Simulation discrete Key features  - Representation of the time graph - Simulation of a waiting system  - Simulation of the time sharing system  - Monte Carlo Matlab simulation, Matlab fundamentals statistical models. Statistical analysis of experimental data with Matlab - SIMULINK  – Modeling, simulation, analysis, libraries - SIMULINK Editor  - Creation of models and subsystems. Signal Visualization - Modeling and Simulation of Dynamical, Discrete and Nonlinear Systems Scilab | interactive  exposition, heuristic  conversation, demonstration |  |
| 8.2 Lecture References  1. Chiş V., Velicescu C., Modeling Transmission Lines Energization with PSCAD/EMTDC, Proceedings of the 6th IEEEInternationalSymposium on Applied Computational Intelligence and Informatics SACI, Timişoara, Romania, 2011, pp.155-158  2. Negrea R., Modelare statistică şi stochastică, Editura Politehnica, Timişoara, 2006  3. Soare C., Iliescu S.St., Făgărăşan I., Tudor V., Niculescu O.F., Proiectare asistată de calculator în Matlab şi Simulink. Modelareaşisimularea proceselor, Editura Agir Bucureşti, 2006  4. \*\*\* https://www.tutorialspoint.com/ | | |

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| 8.3 Seminar Outline | Teaching methods | Remarks |
| 8.4 Seminar References | | |
| 8.5 Laboratory Outline | Teaching methods | Remarks |
| - Matlab fundamentals Getting to know the Matlab  - Simulink working environment Simulink block diagrams. Creating a simple model Graphical modeling and simulation of a pendulum in Simulink  - Modeling and simulation with Scilab  - Modeling and simulation of processes with distributed parameters | - exercise  -documentation on the web |  |
| 8.6 Laboratory References  1. Chiş V., Velicescu C., Modeling Transmission Lines Energization with PSCAD/EMTDC, Proceedings of the 6th IEEEInternationalSymposium on Applied Computational Intelligence and Informatics SACI, Timişoara, Romania, 2011, pp.155-158  2. Negrea R., Modelare statistică şi stochastică, Editura Politehnica, Timişoara, 2006  3. Soare C., Iliescu S.St., Făgărăşan I., Tudor V., Niculescu O.F., Proiectare asistată de calculator în Matlab şi Simulink. Modelareaşisimularea proceselor, Editura Agir Bucureşti, 2006  4. \*\*\* https://www.tutorialspoint.com/ | | |
| 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 discipline is well integrated into the curriculum. Modeling and simulation knowledge is useful both for deepening the modeling methods of a typical engineering problem, and for learning the simulation techniques so necessary in solving many problems encountered in practice.

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

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| Activity type | Evaluation criteria | Evaluation methods | Percentage of the final grade |
| 10.1. Lecture | - correctness and completeness of knowledge  - logical coherence  - degree of assimilation of specific language  - conscientiousness, interest in study. | - Oral evaluation (final in the exam session):  presentation of a final project, free presentation of the student, evaluation conversation, oral questionnaire  - Active participation in classes. | 40%  10% |
| 10.2.  Seminar |  |  |  |
| 10.3.  Laboratory | - the ability to operate with the assimilated knowledge  - the ability to apply in practice | Oral evaluation (final in the exam session):  completion and presentation of the final project, assignments, projects completed along the way | 50% |
| 10.4. Project |  |  |  |
| 10.5 Minimal performance standard  Learning the specific concepts of database management systems, using the specific language, creating 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