# ANEXA 1

<div align="center">

**CURRICULUM**
Valid for the study cycle 2023-2025
"Aurel Vlaicu" University of Arad

</div>

**Faculty of Exact Sciences**
Department **Mathematics and Computer Science**
Name of program **Advanced Studies in Applied Computer Science** (English)
Field of studies **Informatics**
Type of program **Professional**
Length of program / number of ECTS credits    **2 years /120 credits**
Type of education **With attendance**
Graduate title earned **Master in informatics**

## 1. MISSION STATEMENT

The mission of the Master of Science (MSc) program in "Advanced Studies in Applied Computer Science (English)" is to provide academic, research and public service leadership in a field perfectly aligned with the Faculty of Exact Sciences. The aims of this program are to:

- foster research-oriented critical thinking in Informatics and related applications;
- enhancing the educational offer by developing and nurturing a professional environment conducive to scholarship in the pursuit of knowledge; and
- open the European and international dimensions by building communication skills to excel in the profession.

## 2. OBJECTIVES

- Constantly improving skills and expanding knowledge to analyze socio-economical facts and phenomena for discovering solutions andproposing alternatives;
- Applying the acquired knowledge in scientific/professional projects with the aim of finding solutions to the challenges raised by the Romanian as well as European economy
- Developing the skills to find and use methods, procedures and scientific instruments, as well as fostering theability to propose and convey scientific explanations for socio-economical processes and phenomena
- Nurturing English professional communication proficiency, effectiveintegration within multinational/internationalresearch teams

## 3. SPECIFIC EDUCATIONAL OBJECTIVES (COMPETENCES TO BE ACQUIRED)

**Professional educational objectives**

**C1.** Analyze real systems and develop mathematical models for processes and systems that can be applied in engineering and economics.
**C2.** Solve problems in various fields of sciences using mathematical models and computer systems, and use computer related tools for developing software.
**C3.** Read specifications and perform data analysis, design, development as well as deployment of databases using software systems.
**C4.** Perform data analysis and generate and interpret results for supporting decision making processes.
**C5.** Model various processes, design and deploy computational and symbolic models.
**C6.** Elaborate comparative studies of computer systems with respect to their functionalities, efficiency, effectiveness and information security.
**C7.** Offer consultancy on the use of computers and computer applications in sciences, technology and economics.

**Transversal educational objectives**

    **CT1.**General knowledge of computer systems and their integration in various organizations, and continuously learning new concepts and new technologies in the field of computer science.

    **CT2.** Communicate in English on professional subjects with computer specialists, engineers and economists; elaborate technical reports and scientific memos.

    **CT3.** Teaching and lecturing at high school and university levels in the fields of computer science and informatics and on related subjects.

    **CT4.**Perform efficiently within a multidisciplinary team while observing, respecting, and abiding by the professional ethics rules of the specific field.

## 4. ACADEMIC CAREER DEVELOPMENT

The graduates of the Master of Science (MSc) program in "Advanced Studies in Applied Computer Science", according to the Romanian Occupational Catalogue (COR – ISCO-08), can be hired in the following positions:

    2512 – code 251206, Manager of informatics project

## 5. FINAL STIPULATIONS

The Curriculum will be approved, according to the National Education Law, art.137 (2), by the university Senate and after being signed on each page the President of the Senate. Aproved Curriculum valid for study cycle 2023-2025.

## 6. ANALYZIS OF THE CURRICULUM

For the curriculum of the Master of Science (MSc) program in "Advanced Studies in Applied Computer Science", the classification of the courses is presented in the following tables:

- The total number of courses divided in categories according the subject type (proficiency, synthesis, advanced):

| Nr. crt. | Subject Type | Hours per week | | |
|---|---|---|---|---|
| | | Hours | Ratio % | |
| | | | Study program | ARACIS regulations |
| 1 | proficiency course (DA) | 350 | 44,6% | min. ---,0 |
| 2 | synthesis course (DT) | 224 | 28,6% | min. ---,0 |
| 3 | advanced course (DU) | 210 | 26,8% | min. ---,0 |
| | TOTAL | **784** | **100,00%** | --- |

- The total number of hours of this program is 784 (392 hours oflectures and 392 hours of practical activities) divided as follows:
  - Compulsory requirements ...................................................................................**784hours**
  - Internship....................................................................................................**112hours**
  - Internship to prepare the Master Thesis ..............................................................**70hours**
  Total...........................................................................................................**784hours**
- Curriculum structure, according course types (compulsory and elective):

| Course | Hours per curriculum | |
|---|---|---|
| | Hours | Ratio % |
| Compulsory courses | 602 | 76,8% |
| Elective courses | 182 | 23,2% |
| TOTAL | 784 | 100% |

- The ratio between lectures and practice (seminars, laboratories, projects, internship) is 1:1 (392 course hours / 392 practice hours), complying with the ARACIS regulations.
- The Master of Science (MSc) program in "Advanced Studies in Applied Computer Science (English)" complies with the national qualifications provided by the Government Decree HG 1175/2006.
- The courses included in the Curriculum and the subjects studied are perfectly aligned with the Bachelor program (BSc) in Informatics (English) (HG 1175/2006, HG 676/2007).
- The curriculum of the Master of Science (MSc) program in "Advanced Studies in Applied Computer Science" complies with the European Credit Transfer and Accumulation System (ECTS) and with the Romanian Law 400/2006 on the organizing of university master studies.

## 7. TIME SKEDULLING OF THE ACADEMIC YEAR (WEEKS)

| Year | Didactic activities (weeks) | | Exams (weeks) | | | Internship | Holiday (weeks) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sem. I | Sem. II | Winter session | Summer session | Retake session | | Winter | Between semesters | Summer |
| Year I | 14 | 14 | 3 | 3 | 2 | - | 4 | 1 | 10 |
| Year II | 14 | 14 | 3 | 2 | 1 | 70 hrs* | 4 | 1 | - |

*Distributed along the 14 weeks of Sem.II

## 8. HOURS PER WEEK OF COMPULSORY AND ELECTIVE COURSES

| Year | Semester I (hours / week) | | Semester II (hours / week) | |
|---|---|---|---|---|
| | Compulsory courses | Elective courses | Compulsory courses | Elective courses |
| I | 14 | 0 | 14 | 0 |
| II | 7 | 7 | 8 | 6 |

## 9. REQUIREMENTS FOR PASSING, PROMOTION AND COMEBACK

The requirements for passing (admission to the next academic year), promotion or comeback to studies are stated in the ECTS Regulations, in the Procedure of organizing the didactic activity and students grading and in the Regulation of students' professional activity based on credits transfer.

## 10. THE MASTER THESIS

The requirements for preparing, submitting and defending the Master Thesis are stated in the Methodology regarding the organizing and conducting the final exams.
- Communicating the subjects for the Master Thesis: 1-30 October
- Preparing the Master Thesis: 1st of November – 31st of May
- Submitting and defending the Master Thesis: 15th of June – 15st of July
- The final exam consists of defending the Master Thesis (10 credits)

## 11. THE ECTS CREDITS ASSOCIATED WITH THE MASTER PROGRAM
### Total 120credits
- 75,8% credits from compulsory courses
- 24,2% credits from elective courses

**RECTOR**                          **DEAN**                          **HEAD OF DEPARTMENT**
Ramona LILE                          Marius-Lucian TOMESCU          Lorena-Camelia POPA

**CURRICULUM**
**Academic year 2023-2024**
**Year I**

| Code | Subject | Course status | S.I./ Sem (hrs) | Hours per week and Evaluation type | | | | | | | | | | | |
|------|---------|---------------|-----------------|------------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1st Semester 14 weeks | | | | | | 2st Semester 14 weeks | | | | | |
| | | | | C | S | L | Pr | Ev | C | C | S | L | Pr | C | K |
| **COMPULSORY COURSES** | | | | | | | | | | | | | | | |
| GmFA1O01 | Analiza avansată a datelor/ Advanced Topics in Data Analysis | DA | 133 | 2 | - | 1 | - | Ex | 7 | - | - | - | - | - | - |
| GmFA1O02 | Optimizare matematică/ Mathematical optimization | DA | 108 | 2 | 1 | - | - | Ex | 6 | - | - | - | - | - | - |
| GmFA1O03 | Matematici computaționale / Computational mathematics | DA | 108 | 2 | - | 1 | - | Ex | 6 | - | - | - | - | - | - |
| GmFU1O04 | Rețele neuronale/ Neural Networks | DU | 108 | 2 | - | 1 | - | Ex | 6 | - | - | - | - | - | - |
| GmFT1O05 | Proiect în baze de date / Research project in databases | DT | 97 | - | - | - | 2 | C | 5 | - | - | - | - | - | - |
| GmFU2O06 | Programare pe platforme mobile/ Programming on mobile platforms | DU | 133 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 7 |
| GmFA2O07 | Limbaje de programare pentru baze de date / Programming languages for databases | DA | 108 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 6 |
| GmFA2O08 | Sisteme dinamice și control optimal/ Dynamic systems and optimal control | DA | 108 | - | - | - | - | - | - | 2 | 1 | - | - | Ex | 6 |
| GmFU2O09 | Quantum Computing | DU | 108 | - | - | - | - | - | - | 2 | 1 | - | - | Ex | 6 |
| GmFT2O10 | Proiect în programare pe platforme mobile/ Project in programming on mobile platforms | DT | 97 | - | - | - | - | - | - | - | - | - | 2 | C | 5 |
| **TOTAL** | | | | **8** | **1** | **3** | **2** | **-** | **30** | **8** | **2** | **2** | **2** | **-** | **30** |
| **FACULTATIVE COURSES** | | | | | | | | | | | | | | | |

| RECTOR | DEAN | HEAD OF DEPARTMENT |
|--------|------|---------------------|
| Ramona LILE | Marius-Lucian TOMESCU | Lorena-Camelia POPA |

Legend:    C – Lecture;  S – Seminar; L – Laboratory; P – Project; SI – Individual Study; Ev – Evaluation;  K – Credits;
        DA– proficiency course; DT – synthesis course; DU – advanced course

**CURRICULUM**
**Academic year 2024-2025**
**Year II**

| Code | Subject | Course status | S.I./ Sem (hrs) | 1st Semester 14 weeks | | | | | | 2st Semester 14 weeks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | C | S | L | Pr | Ev | K | C | S | L | Pr | Ev | K |
| **COMPULSORY COURSES** | | | | | | | | | | | | | | | |
| GmFU3O01 | Tehnici avansate de criptare și securitate a informatiei / Advanced encryption and information security techniques | DU | 133 | 2 | - | 1 | - | Ex | 7 | - | - | - | - | - | - |
| GmFT3O02 | Metode de cercetare/ Research methods | DT | 97 | 1 | 1 | - | - | C | 5 | - | - | - | - | - | - |
| GmFT3O03 | Proiect în tehnici avansate de criptare și securitate a informatiei / Project in advanced encryption and information security techniques | DT | 97 | - | - | - | 2 | C | 5 | - | - | - | - | - | - |
| GmFT4O04 | Proiect în inteligență artificială / Project in artificial intelligence | DT | 97 | - | - | - | - | - | - | - | - | - | 2 | C | 5 |
| GmFT4O05 | Etică și integritate academică / Academic ethics and integrity | DT | 36 | - | - | - | - | - | - | 1 | - | - | - | C | 2 |
| GmFT4O06 | Elaborarea lucrării de disertație / Elaboration of the dissertation thesis | DT | 105 | - | - | - | - | - | - | - | - | - | 5 | C | 7 |
| | **TOTAL** | | | **3** | **1** | **1** | **2** | **-** | **17** | **1** | **-** | **-** | **7** | **-** | **14** |
| **ELECTIVE COURSES** | | | | | | | | | | | | | | | |
| | **Package 1** | | | | | | | | | | | | | | |
| GmFA3A11 | Data science | DA | 108 | 2 | - | 1 | - | Ex | 6 | - | - | - | - | - | - |
| GmFA3A12 | Aplicații ale algebrei Lie/ Applications of Lie algebra | DA | 108 | 2 | - | 1 | - | Ex | 6 | - | - | - | - | - | - |
| | **Package 2** | | | | | | | | | | | | | | |
| GmFA3A21 | Soluții moderne pentru E-business/ Modern solutions for E-business | DA | 133 | 2 | - | 2 | - | Ex | 7 | - | - | - | - | - | - |
| GmFA3A22 | Sisteme stochastice/ Stochastic systems | DA | 133 | 2 | - | 2 | - | Ex | 7 | - | - | - | - | - | - |
| | **Package 3** | | | | | | | | | | | | | | |
| GmFU4A31 | Calcul neuronal aplicat/ Neural Computations | DU | 158 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 8 |
| GmFU4A32 | Programare în aplicații CAD/ Programming in CAD applications | DU | 158 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 8 |
| | **Package 4** | | | | | | | | | | | | | | |
| GmFA4A41 | Sisteme de control fuzzy/ Fuzzy control systems | DA | 158 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 8 |
| GmFA4A42 | Statistică aplicată în științe tehnice și naturale/ Statistics applied in technical and natural sciences | DA | 158 | - | - | - | - | - | - | 2 | - | 1 | - | Ex | 8 |
| | **TOTAL** | | | **4** | **-** | **3** | **-** | **-** | **13** | **4** | **-** | **2** | **-** | **-** | **16** |
| **TOTAL** | | | | **7** | **1** | **4** | **2** | **-** | **30** | **5** | **-** | **2** | **7** | **-** | **30** |

| Activity | Evaluation | Credits |
|---|---|---|
| Final exam for the Master's degree | Exam | 10 |

**RECTOR**
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Legend:    C – Lecture;  S – Seminar; L – Laboratory;  P – Project; SI – Individual Study; Ev – Evaluation; K – Credits;
          DA– proficiency course; DT – synthesis course; DU – advanced course