# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **1) Computers and information technology** |
| 1.4 Field of study | **2) Computers and information technology** |
| 1.5 Study cycle | **3) Bachelor** |
| 1.6 Study program/Qualification | **4) / 5) Computers** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **[6] Software engineering II** | | | |
| 2.2 Holder of the subject | | | | Prof. IOAN MANG | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | Associate Assistant dr. OVIDIU COMAN | | | |
| 2.4 Year of study | IV | 2.5 Semester | 7 | 2.6 Type of the evaluation | [7] Ex | 2.7 Subject regime | [8] SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/1 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/14 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 20 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 44 |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **84** |
| **3.9 Total of hours per semester** | **140** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector - Attendance at least 50% of the courses |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Room equipped with computers and specific programs - Mandatory attendance at all laboratories; - A maximum of 3 works can be recovered during the semester (20%);<br>The frequency of laboratory hours below 80% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | C2. Software component design<br>• Description of the structure and operation of software components<br>• Explaining the role, interaction and operation of software system components<br>C4. Improving the performance of software systems<br>• Explaining the interaction of factors that determine software performance<br>• Design and integration of information systems using technologies and programming environments<br>C5. Design, life cycle management, integration and integrity of software systems<br>• Specifying the relevant criteria regarding the life cycle, quality, safety and interaction of the computer system with the environment and with the human operator<br>• The use of interdisciplinary knowledge for the adaptation of the computer system in relation to the requirements of the field of applications<br>• Maintenance and operation of software systems. |
| Transversal skills | CT1. Honorable, responsible, ethical conduct in the spirit of the law to ensure the reputation of the profession |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ elaboration and study of the theories, methods and tools necessary for the elaboration of software products<br>▪ The aim is to acquire the theoretical notions of programming engineering: coding, program testing, delivery and documentation and maintenance of software projects. |
| 7.2 Specific objectives | ▪ Programming styles<br>▪ Coding metrics<br>▪ Testing software modules. General testing issues for object-oriented software<br>▪ Utilities for compressing, decompressing or storing software files. Installing. Documentation.<br>▪ Corrective maintenance. Adaptive software maintenance. Preventive software maintenance.<br>▪ Maintenance of an important software project |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Objectively oriented design. | Presentation, free discussions | 2 |
| Chapter 2. Real-time application design. | Presentation, free discussions | 2 |
| Chapter 3. Design of user interfaces. | Presentation, free discussions | 2 |
| Chapter 4. Software development. | Presentation, free discussions | 2 |
| Chapter 5. Software reuse. | Presentation, free discussions and report | 2 |
| Chapter 6. Component-based software engineering. | Presentation, free discussions | 2 |
| Chapter 7. Development of critical systems. | Presentation, free discussions and report | 2 |
| Chapter 8. Software evolution. | Presentation, free discussions | 2 |
| Chapter 9. Verification and validation. | Presentation, free discussions | 2 |
| Chapter 10. Testing software systems. | Presentation, free discussions | 2 |

| | | |
|---|---|---|
| Chapter 11. Validation of systems | Presentation, free discussions | 2 |
| Chapter 12. Team management. | Presentation, free discussions. | 2 |
| Chapter 13. Estimating the cost of software. | Presentation, free discussions. | 2 |
| Chapter 14. Quality management. | Presentation, free discussions. | 2 |
| Bibliography<br>1. Software Engineering - Ian Sommerville, Editura Addison-Wesley, 2000<br>2. Software Engineering. Principles and practice - Hans van Vliet, Editura John Wiley & Sons, 2010<br>3. Software Engineering - modern approaches. - Eric J. Braude, Michael E. Bernstein, Editura John Wiley & Sons, 2008 | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Laboratory | | |
| 1. Software systems planning | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 2. Systems design. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 3. System implementation | Introductory lecture; free and individual discussions; implementation of proposed programs. | 4 |
| 4. Implementation and integration of software systems | Introductory lecture; free and individual discussions; implementation of proposed programs. | 4 |
| 5. Software maintenance | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 8.4 Project | | |
| 1. Presentation of project themes. | Discussions. Individually work and also in small groups of students. | 2 |
| 2. Establishing the requirements | Discussions. Individually work and also in small groups of students. | 2 |
| 3. Design and modularization of the application | Discussions. Individually work and also in small groups of students. | 2 |
| 4. Writing the code | Discussions. Individually work and also in small groups of students. | 2 |
| 5. Testing and implementing the application | Discussions. Individually work and also in small groups of students. | 2 |
| 6. Elaboration of design and use documentation. | Discussions. Individually work and also in small groups of students. | 2 |
| 7. Teaching and supporting the project | Discussions. Individually work and also in small groups of students. | 2 |
| Bibliography<br>1. Ingineria programarii, indrumator de laborator - I. Mang, R. Gyorodi, Al. Toth, Univ. din Oradea, 2001 | | |

2. Software Engineering. Principles and practice - Hans van Vliet, Editura John Wiley & Sons, 2010
3. Software Engineering - modern approaches. - Eric J. Braude, Michael E. Bernstein, Editura John Wiley & Sons, 2008

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

Use of specific theories and tools to explain the operation and structure of software systems
Description of the structure and operation of software components Explaining the role, interaction and operation of software system components The content of the discipline is adapted to the requirements of specialized companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>- For 10: the correct solving of all the subjects at the exam, the presence and activity at courses<br>Activity at classes and essays | Final course evaluation and problem solving.<br><br>Presentation of papers, attendance at courses | 60% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard Checking the theoretical preparation for the laboratory class and the way of accomplishing the proposed topics.<br>In order to participate in the exam, it is necessary to perform all the laboratory works and to obtain a grade of 5 for the activity carried out during the semester.<br>- For 10: the presence and activity at laboratory | Weekly evaluation of the laboratory preparation Tracking the activity along the way, practical applications. | 20% |

| | | | |
|---|---|---|---|
| 10.7 Project | In order to obtain grade 5, the student will have to teach the project in written form, treating the proposed topic theoretically. | At the end of the semester, the project is taught and supported in front of colleagues. It follows the evolution during the semester, the support of the project, the way of writing. | 20% |
| 10.8 Minimum performance standard:<br>Course:<br>Academic seminar:<br>Laboratory:<br>Project:<br>- Carrying out projects respecting ethical and responsible behavior;<br>- To be able to solve small and medium size problems in a POO manner in C ++ and Java.<br>- To know the design methods that are used and the differences between them. | | | |

**Completion date:**

**Date of endorsement in the department:**

**Date of endorsement in the Faculty Board:**

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:
- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems

- Electromechanics
- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications

B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:

A. For Bachelor study programs:
- GD - General Discipline
- FD - Fundamental Discipline
- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice

B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **1) Computers and information technology** |
| 1.4 Field of study | **2) Computers and information technology** |
| 1.5 Study cycle | **3) Bachelor** |
| 1.6 Study program/Qualification | **4) / 5) Computers** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **[6] Data security** | | | | | |
| 2.2 Holder of the subject | | Prof. IOAN MANG | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Associate professor LAVINIU TEPELEA | | | | | |
| 2.4 Year of study | III | 2.5 Semester | 6 | 2.6 Type of the evaluation | [7] Ex | 2.7 Subject regime | [8] SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/1 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 40 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 20 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 20 |
| Tutorials | 4 |
| Examinations | 8 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **92** |
| **3.9 Total of hours per semester** | **148** |
| **3.10 Number of credits** | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector - Attendance at least 50% of the courses |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Room equipped with computers and specific programs - Mandatory attendance at all laboratories; - A maximum of 3 works can be recovered during the semester (20%);<br>The frequency of laboratory hours below 80% leads to the restoration of the discipline |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | C5 - Design, life cycle management, integration and integrity of software systems.<br>• Specifying the relevant criteria regarding the life cycle, quality, safety and interaction of the computer system with the environment and with the human operator<br>• The use of interdisciplinary knowledge for the adaptation of the computer system in relation to the requirements of the field of applications |
| Transversal skills | CT2. Identification, description and development of projects in project management, taking over the different roles in the team and clear and concise description, verbally and in writing, in Romanian and in an international language, of the results in the field of activity<br>• Familiarization with the roles and activities specific to teamwork and distribution of tasks for subordinate levels |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | • Study of information protection techniques specific to network computing with special emphasis on cryptographic methods.<br>• Most classical cryptographic techniques, block, flow, public key encryption algorithms and electronic signatures and certificates are studied.<br>• The aim is to better understand the algorithms, the effective implementation of the most important algorithms used in any specific technology: object-oriented programming and the design of dedicated chips or the programming of microcontrollers |
| 7.2 Specific objectives | • Adequate use of quality, safety and security standards in information processing<br>• Carrying out a small and medium-sized project including identifying and analyzing the problem, designing, developing and demonstrating an understanding of the need for quality<br>• Carrying out projects in a team, assuming different roles<br>• After passing the course students will be able to: apply encryption algorithms, implement encryption algorithms in various programming languages, apply security measures on the Internet, analyze viruses and apply protection methods |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Security and integrity. | Presentation, free discussions | 2 |
| Chapter 2. About keys and key security. | Presentation, free discussions | 2 |
| Chapter 3. Character sets and cryptography. | Presentation, free discussions | 2 |
| Chapter 4. Linear substitution. | Presentation, free discussions | 2 |
| Chapter 5. Elementary cryptanalysis. | Presentation, free discussions | 2 |
| Chapter 6. Polyalphabetic substitution. | Presentation, free discussions | 2 |
| Chapter 7. Prime numbers and their importance in cryptography. | Presentation, free discussions | 2 |
| Chapter 8. DES. | Presentation, free discussions | 2 |
| Chapter 9. IDEA. | Presentation, free discussions | 2 |
| Chapter 10. The RSA algorithm. | Presentation, free discussions | 2 |
| Chapter 11. ESA candidates. | Presentation, free discussions | 2 |
| Chapter 12. INTERNET security. | Presentation, free discussions and report | 4 |
| Chapter 13. Viruses and virus protection. | Presentation, free discussions. | 2 |
| | Presentation, free discussions. | 2 |
| Bibliography | | |

1. Applied cryptography - Bruce Schneier, Editura John Wiley & Sons, Inc, 0-471-12845-7, 1997
2. Introduction to Cryptology and PC security - Brian Beckett, Editura Mc Graw Hill, ISBN-13: 9780077092351, 1997
3. Computer security basics. - Deborah Russel and G.T. Gangemi Sr, Editura O'Reilly & Assoc, 0-937175-71-4, 1993
4. Java Cryptography - Jonathan Knudsen, Editura O'Reilly, ISBN 10: 1-56592-402-9, 1998
5. Introducere în tehnica securităţii datelor - Mang Ioan, Editura Universităţii din Oradea, ISBN 973-9416-44, 1999
6. Probleme de securitate a datelor - Ioan Mang, Editura Universităţii din Oradea, ISBN 978-606-10-0327-3, 2010

| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Laboratory | | |
| 1. Polyalphabetic substitution | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 2. Polygramic substitution. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 3. The DES standard | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 4. The IDEA system | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 5. RSA figure. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 6. Merkle-Hellman cipher. | | 2 |
| 7. Viruses | | 2 |

Bibliografie:
1. Lucrări practice de tehnici de securitate a datelor - Mang Ioan, Mang Erica, Popescu C., Editura Universităţii din Oradea, 2002
2. Algoritmi moderni de criptare - Mang Ioan, Editura Universităţii din Oradea, ISBN 973-613-270 -6, 2002

| 8.4 Project | | |
|---|---|---|
| Themes: Web application for encrypting / decrypting documents, using the AES algorithm<br>Encrypted chat with AES algorithm<br>Encrypted SMS sending application<br>Web application for encrypting / decrypting documents, using the TripleDes algorithm<br>Encrypted chat application using the AES algorithm | Discussions.<br>Individually work and also in small groups of students. | 14 |

Bibliografie:
1. Lucrări practice de tehnici de securitate a datelor - Mang Ioan, Mang Erica, Popescu C., Editura Universităţii din Oradea, 2002
2. Algoritmi moderni de criptare - Mang Ioan, Editura Universităţii din Oradea, ISBN 973-613-270 - 6, 2002
3. Applied cryptography - Bruce Schneier, Editura John Wiley & Sons, Inc, 0-471-12845-7, 1997
4. Introduction to Cryptology and PC security - Brian Beckett, Editura Mc Graw Hill, ISBN-13: 9780077092351, 1997
5. Computer security basics. - Deborah Russel and G.T. Gangemi Sr, Editura O'Reilly & Assoc, 0-937175-71-4, 1993
6. Java Cryptography - Jonathan Knudsen, Editura O'Reilly, ISBN 10: 1-56592-402-9, 1998
7. Introducere în tehnica securităţii datelor - Mang Ioan, Editura Universităţii din Oradea, ISBN 973-9416-44, 1999
8. Probleme de securitate a datelor - Ioan Mang, Editura Universităţii din Oradea, ISBN 978-606-10-0327-3, 2010

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is adapted to the requirements of specialized companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>- For 10: the correct solving of all the subjects at the exam, the presence and activity at courses | Final course evaluation and problem solving. | 60% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard Checking the theoretical preparation for the laboratory class and the way of accomplishing the proposed topics. | Weekly evaluation of the laboratory preparation Tracking the activity along the way, practical applications. | 20% |

| | | | |
|---|---|---|---|
| | In order to participate in the exam, it is necessary to perform all the laboratory works and to obtain a grade of 5 for the activity carried out during the semester.<br>- For 10: the presence and activity at laboratory | | |
| 10.7 Project | In order to obtain grade 5, the student will have to teach the project in written form, treating the proposed topic theoretically. | At the end of the semester, the project is taught and supported in front of colleagues. It follows the evolution during the semester, the support of the project, the way of writing. | 20% |
| 10.8 Minimum performance standard:<br>Course:<br>Academic seminar:<br>Laboratory:<br>Project:<br>• To carry out projects respecting the ethical and responsible behavior;<br>• Apply encryption algorithms<br>• Implement encryption algorithms in various programming languages<br>• To apply security measures on the internet<br>• Analyze viruses and apply protection methods. | | | |

**Completion date:**

**Date of endorsement in the department:**

**Date of endorsement in the Faculty Board:**

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:

- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems
- Electromechanics
- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications
B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:
A. For Bachelor study programs:
- GD - General Discipline
- FD - Fundamental Discipline
- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice
B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | *Computers and Information Technology* |
| 1.4 Field of study | *Computers and Information Technology* |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | *Computers & Information Technology /* Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | *Computer Architecture II* | | | | | |
| 2.2 Holder of the subject | | Prof.dr.habil.eng. Daniela Elena Popescu | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **lect.dr.ing. Mircea-Petru Ursu** | | | | | |
| 2.4 Year of study III | | 2.5 Semester 5 | | 2.6 Type of the evaluation | 7) Ex | 2.7 Subject regime | 8) DD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 2/1 |
| 3.4 Total of hours from the curriculum | 70 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 28/ 14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 28 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | **28** |
| Tutorials | 10 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **98** |
| **3.9 Total of hours per semester** | **168** |
| **3.10 Number of credits** | **6** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - The course can be held face to face or online "<br>- attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | - The seminar / laboratory / project can be held face to face or online<br>- Mandatory presence at all laboratories;<br>- Students must have completed the theoretical part of the paper; |

| | |
|---|---|
| | - A maximum of 4 works can be recovered during the semester (30%);<br>- The frequency at laboratory hours below 70% leads to the restoration of the discipline |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | CP3. Problem solving using Computer Science and engineering tools<br><br>CP5. Design, life cycle management, integration and integrity of hardware, software and communications systems |
| Transversal skills | CT1. Applying, in the context of compliance with the law, intellectual property rights (including technology transfer), product certification methodology, principles, norms and values of the code of professional ethics within its own rigorous, efficient and responsible work strategy<br><br>CT2. Identify roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The discipline aims to familiarize students with specialization with as much knowledge: theoretical and practical, related to the structure and operation of computer systems, so that students are able to understand the operation of modern systems, and the parallelism in their implementation. |
| 7.2 Specific objectives | Course:<br>▪ Understanding arithmetic and logic operations. Classification of summation structures according to the mode of transport propagation<br>▪ Understanding Input, output, connection topologies.<br>▪ General information about computer networks, Network topologies, network standards, and network protocols<br>▪ Parallel computer architectures, Parallelism in systems with a central unit, Parallelism in systems with several central units, Classification of architectures,<br>▪ Understanding Parallelism in time (pipeline), Parallelism in Space (Processor Areas), Vector processing,<br>▪ Architectures based on the concept of data flow, Systolic architectures<br>Laboratory & Project:<br>▪ Fixing the architecture, exterior interface signals, and instruction set for the processor project theme. Realization of the data processing unit at the level of the processor to be designed, Following the execution phase of the instruction for each instruction, Elaboration of the flowchart of the instruction cycle for the whole., Implementation of the control unit and the block of control circuits,, The project provides the necessary knowledge to the students in order to be able to design a minimum calculation system starting from some given specifications. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Central units and arithmetic-logic units, wired control and microprogrammed control. Particularities of information representation in computing systems. How to perform arithmetic and logic operations. Classification of summation structures according to the mode of transport propagation | • Free course presentation with video projector / overhead projector and blackboard in an interactive way: punctuate from time to time questions for students in order to increase the degree of interactivity | 4 |
| Chapter 2. Input, output, connection topologies. Bus communications. Protocols. Arbitrations. Methods of | | 4 |

| | | |
|---|---|---|
| communication with IO devices (Inputs-Outputs, Interrupts, DMA) | • Indication of topics for documentation and individual study | |
| Chapter 3. General information about computer networks, Network topologies and standards, HDLC protocol. ISO model of OSI architecture. ARPA Internet. Network topologies, standards and protocols | | 4 |
| Chapter 4 Parallel computer architectures, Parallelism in systems with a central unit, Parallelism in systems with several central units, Classification of architectures | | 2 |
| Chapter 5 Parallelism in time - The concept of pipeline, The organization of memory in structures with pipeline, Central units using pipeline. Arithmetic units with pipeline, Problems of these structures, Computers with BA | | 4 |
| Chapter 6 Parallelism in Space - Processor Areas (PA). Characterization of PA, Types of Organizations, Associative PAs, Static and Dynamic Interconnection Networks, Problems Considered in PA Design, Multiple Processor Areas, Computers with PAs | | 2 |
| Chapter 7 Vector processing, The typical structure of a vector computer, The concept of vector processing and assembly tape. Examples of vector processors. | | 2 |
| Chapter 8 Architectures based on the concept of data flow., Graphical representation of programs, General structure of a system with data flow, Types of architectures with data flow, Static data structures and dynamic data structures, Disadvantages of the concept of data flow. data flow | | 2 |
| Chapter 9 Systolic architectures, Characteristics of systolic architectures, Types of systolic structures, Tolerance to failures in systolic structures, Computers with systolic architecture. Algorithms / structures ratio | | 2 |

Bibliography


- Course notes (slides) made available to students in electronic format on the Office 365 platform, https://uoradea-my.sharepoint.com/personal/daniela_popescu_didactic_uoradea_ro/Documents/Forms/All.aspx
- William Stalings, Computer Organization and Architecture, 9th Edition, March 11, 2012 | ISBN-10: 013293633X | ISBN-13: 978-0132936330, Computer Science Series
- Course notes Architecture systems architecture, D.E.Popescu, posted on the Office platform for CTI students
- Popescu Daniela E .. - Architecture and organization of conventional computer systems ,, University of Oradea Publishing House, Oradea, 2002, ISBN 973-613-225-0, 2002
- D.E.Popescu, C.Popescu, Architecture of computer systems, University Publishing House, laboratory supervisor, ISBN 973-613-225-9, 2002
- Popescu Daniela E., Introduction to the architecture of computer systems, MATRIX ROM publishing house Bucharest, ISBN 973 - 685-067 –6
- K.Hwang, F.A. Briggs - Computer Architecture and Parallel processing, Treira Publishing House, Mc Graw - Hill Book company 1987

- Mircea Popa, Introductions in parallel and unconventional architectures, AS Computer Press Publishing House Timişoara 1992

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Presentation of the laboratory, of the labor protection norms and of the problems specific to the field of computer systems - generalities regarding the architecture of computer systems. | Students receive (via the Internet) the laboratory papers at least one week in advance and study them. Then, the students carry out the practical part of the work under the guidance of the teacher. The tools used are: ALTERA Quartus II Web Edition - integrated environment for the development and simulation of digital circuits ALTERA DE1 - Configurable test board, designed for teaching purposes (FPGA programming) | 2 |
| 2. A computing system based on the NIOS II processor. | | 2 |
| 3. Input / output ports (part one). | | 2 |
| 4. Input / output ports (part two). | | 2 |
| 5. Interrogation. | | 2 |
| 6. Interruption. | | 2 |
| 7. Assessment of knowledge. Test 1. | | 2 |
| 8. Multiprocessor systems. | | 2 |
| 9. Using the audio port. | | 2 |
| 10. Using the video port (part one). | | 2 |
| 11. Using the video port (part one). | | 2 |
| 12. Audio-video application. | | 2 |
| 13. Assessment of knowledge. Test 2. | | 2 |
| 14. Laboratory recoveries. Ending the situation. | | 2 |

Bibliography

1. Course notes (slides) made available to students in electronic format on the Office 365 platform, https://uoradea-my.sharepoint.com/personal/daniela_popescu_didactic_uoradea_ro/Documents/Forms/All.aspx
2. D.E.Popescu, C.Popescu, Architecture of computer systems, University Publishing House, laboratory supervisor, ISBN 973-613-225-9, 2002
3. Office 365 platform on which the laboratory works are loaded
4. Laboratory guide Computer systems architecture, Daniel Filipaș
5. Architecture and organization of conventional computing systems - laboratory works guide, revised edition,, University of Oradea Publishing House, ISBN: 978-606-10-0678-6

| 8.3 Academic project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Design of a microprogrammed system based on the NIOS II processor, starting from some given specifications. | | |
| Design steps:<br>1. Presentation of project themes. Each student receives a homework assignment.<br>2. - 6. Realization of the system using the components of Quartus II Web Edition, writing programs to run on this system and fulfilling the requirements of the project theme, testing the system / programs with the Altera DE1 board, questions and answers related to the problems encountered, preparation of project documentation.<br>7. Project support, practical verification of operation and grading. | Students receive the design theme and design methodology and complete the project stages under the guidance of the teacher. The tools used are: ALTERA Quartus II Web Edition - integrated environment for the development and simulation of digital circuits ALTERA DE1 - Configurable test board, designed for teaching purposes (FPGA programming). | 2 hours are allocated for each of the 7 detailed points of the laboratory activity. |

Bibliography

1. ALTERA Quartus II Web Edition
2. Annexes of the laboratory supervisor - Daniel Filipaș Laboratory supervisor Computer systems architecture, Daniel Filipaș

3. Architecture and organization of conventional computing systems - laboratory works guide, revised edition,, University of Oradea Publishing House, ISBN: 978-606-10-0678-6

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer and Information Technology specializations and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc. ), and knowledge of the architecture and organization of computer systems as well as their operation and design is a stringent requirement of employers in the field (Rds & Rcs, Plexus, Neologic, Celestica, Keysys, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5) in accordance with the minimum performance standard:<br>- it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br><br>For 10:<br>- for grade 10, a thorough knowledge of all is required | The evaluation can be done face to face or online depending on the situation imposed | 70% |
| 10.6 Laboratory | - for mark 5 it is necessary to solve the corresponding number of requirements, depending on the test scale.<br><br>- for mark 10, all requirements on the test sheet must be correctly resolved. | Tests during the semester<br>The evaluation of students is done through two tests, taken during the semester.<br>The arithmetic mean of the marks of these tests represents the mark with which they enter the exam.<br>Students can also get extra points, depending on their participation in the laboratory and solving exercises with a higher degree of difficulty. These points can be used to calculate the test score. | 30% |
| 10.7 Project | - for mark 6, going through the design stages, without going into the design details. | Oral presentation<br>Following the presentation of the project completed during | 100% |

| | | | |
|---|---|---|---|
| | - for mark 10, going through all the design stages, with the completion of the elaboration of the project theme. | the semester, each student receives a grade, separate from the exam. | |
| 10.8 Minimum performance standard:<br>Assimilation of detailed knowledge about the construction, operation and design of central processing units for digital computers, as well as about the organization of different types of memories associated with them. The studied design methods are exemplified on existing architectures, including the study of special architectures. A VHDL processor for the FPGA will be designed.<br>The term solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level.<br>Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, own research related to learning (library, internet), cultivating a discipline of work, done correctly and on time | | | |

**Completion date:**
08.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **Data bases** | | | |
| 2.2 Holder of the subject | | | | Prof. dr. ing. Győrödi Cornelia Aurora | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | Sef. Lucr. Dr. Ing. Pecherle George Dominic | | | |
| 2.4 Year of study | II | 2.5 Semester | 2 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | DD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 18 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 10 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 10 |
| Tutorials | 4 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **44** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer - The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with video projector and computers that are connected to the internet, and they have installed Oracle 12c software. The laboratory can take place face to face or online |
| **6. Specific skills acquired** | |

| | |
|---|---|
| Professional skills | C2. Designing hardware, software and communication components<br>C3. Solving problems using computer science and engineering instruments |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning the fundamental notions regarding the concepts of relational database theory and SQL relational language. Acquiring the skills needed to design and implement relational database management applications. |
| 7.2 Specific objectives | ▪ Learning the fundamental theory concepts of database. The steps of database design. The entity-relationship model of databases. The relational model of databases. The defining of the integrity constraints of the relational databases. The SQL relational language. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| CHAPTER.1. The elements of database theory | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| CHAPTER.2. The Entity-relationship model | | 4 hours |
| CHAPTER.3. Normalization theory of relational databases | | 4 hours |
| CHAPTER.4. Concepts used in the relational model | | 2 hours |
| CHAPTER.5. The Relational language. SQL language.<br>- Data types in SQL<br>- Defining the schema of a relational database | | 2 hours |
| CHAPTER.6. Join operations in SQL language | | 2 hours |
| CHAPTER 7. The Data manipulation language in SQL. Defining of index files and views | | 2 hours |
| CHAPTER 8. Advanced join techniques | | 2 hours |
| CHAPTER 10. Aggregate functions in SQL | | 2 hours |
| CHAPTER 11. Subqueries in SQL. Sets of operators in SQL | | 2 hours |
| CHAPTER 12. Controlling access to the relational database.<br>- Transaction control in the relational database | | 4 hours |

Bibliography


1. Ion Lungu, Anca Andreescu, Adela Bâra, Anda Belciu, Constanța Bodea, Iuliana Botha, Vlad Diaconița, Alexandra Florea, **Cornelia Győrödi**, " Tratat de baze de date. Sisteme de gestiune a bazelor de date ", Volumul 2, Editura ASE, 2015, ISBN 978-606-505-472-1, nr. pag 375.
2. Győrödi Cornelia**,** Lungu Ion "*Sisteme de baze de date avansate*", Editura Universității din Oradea, 2011, ISBN 978-606-10-0447-8, nr. pag 350.

3. Győrödi Cornelia, Pecherle George, "*Baze de date relaţionale. Teorie şi aplicaţii în Oracle*", Editura Universitati, 2008, ISBN 978-973-759-460-0.
4. Baze de date relaţionale. Teorie şi aplicaţii - Győrödi Cornelia, Editura Treira – 2000, ISBN 973-8159-23-7.
5. David M. Kroenke , David J. Auer – Database Processing: Fundamentals, Design and Implementation, 15th Edition, Pearson, 2019, ISBN: 978-0134802749.
6. Abraham Silberschatz, Database System Concepts, 7th Ed., McGraw-Hill, 2019, ISBN 9780078022159.
7. Ileana Popescu -"Baze de date relaţionale", Editura Universităţii din Bucureşti, 1996.
8. Oracle Education."SQL1", Oracle Corporation, 2019.
9. Oracle Academy iLearning (https://academy.oracle.com)
10. https://e.uoradea.ro/course/view.php?id=1929 Materials (courses and laboratories)

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Getting started with database management systems. Installing and configuring Oracle SQL Developer Data Modeler systems, Oracle 12c. | Oral presentation. Students work with the following tools: - Oracle SQL Developer Data Modeler - Oracle Application Express<br><br>The students are assessed by a practical test using computer from laboratory topics. | 2 hours |
| 2. Entity-relationship diagram for a practical application. | | 2 hours |
| 3. Normalization of the relational database. Normal forms FN1, FN2, FN3, FNCB of the concept model. Practical applications - case study. | | 2 hours |
| 4. Transforming the conceptual model into a physical model. Practical applications - case study. | | 4 hours |
| 5. SQL language. The SQL command for querying a table | | 2 hours |
| 6. Join operations in SQL language | | 2 hours |
| 7. The Data manipulation language in SQL. Defining of index files and views | | 2 hours |
| 8. Advanced join techniques | | 2 hours |
| 9. Aggregate functions in SQL | | 2 hours |
| 10. Subqueries in SQL. Sets of operators in SQL | | 2 hours |
| 11. Controlling access to the relational database. GRANT and REVOKE commands. | | 2 hours |
| 12. Transaction control in the relational database. Commit, Savepoint and Rollback commands. | | 2 hours |
| 13. Design and implementation of a library management application. | | |
| 14. Final test | | 2 hours |

Bibliography

1. Ion Lungu, Anca Andreescu, Adela Bâra, Anda Belciu, Constanța Bodea, Iuliana Botha, Vlad Diaconița, Alexandra Florea, **Cornelia Győrödi**, " Tratat de baze de date. Sisteme de gestiune a bazelor de date ", Volumul 2, Editura ASE, 2015, ISBN 978-606-505-472-1, nr. pag 375.
2. Győrödi Cornelia**,** Lungu Ion "*Sisteme de baze de date avansate*", Editura Universității din Oradea, 2011, ISBN 978-606-10-0447-8, nr. pag 350.
3. Győrödi Cornelia, Pecherle George, "*Baze de date relaţionale. Teorie şi aplicaţii în Oracle*", Editura Universitati, 2008, ISBN 978-973-759-460-0.
4. Oracle SQL Developer Data Modeler (http://www.oracle.com/technetwork/developer-tools/datamodeler/overview/index.html
5. Oracle Application Express (https://iacademy.oracle.com/ )
6. Oracle Academy iLearning (https://academy.oracle.com)
7. https://e.uoradea.ro/course/view.php?id=1929 Materials (courses and laboratories)

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved<br>- For 10: 100% of the subjects from the final exam should be correctly solved | Semester exam – written | 66% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Oral/written | 34% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: 50% of the maximum score of the final exam<br>Academic seminar:<br>Laboratory: 50% of the maximum score of the laboratory evaluations<br>Project: | | | |

Course instructor

Head of department

**Completion date:**
**05.09.2022**

prof. dr. ing. Cornelia Győrödi
E-mail: cgyorodi@uoradea.ro

conf. dr. ing. Pater Mirela

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | *Computers and Information Technology* |
| 1.4 Field of study | *Computers and Information Technology* |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | *Computers & Information Technology* / **Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | *Digital Electronics 1* | | | | | |
| 2.2 Holder of the subject | | Prof.dr.habil.eng. Daniela Elena Popescu | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **lect.dr.ing. Mircea-Petru Ursu** | | | | | |
| 2.4 Year of study **II** | | 2.5 Semester **3** | | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **DD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **3** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **42** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **14** |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | **22** |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| 3.7 Total of hours for individual study | **70** |
| 3.9 Total of hours per semester | **112** |
| 3.10 Number of credits | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - The course can be held face to face or online "<br>- attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | - The seminar / laboratory / project can be held face to face or online<br>- Mandatory presence at all laboratories;<br>- Students must have completed the theoretical part of the paper;<br>- A maximum of 4 works can be recovered during the semester (30%); |

| | |
|---|---|
| | - The frequency at laboratory hours below 70% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | CP3. Problem solving using Computer Science and engineering tools<br><br>CP5. Design, life cycle management, integration and integrity of hardware, software and communications systems |
| Transversal skills | CT1. Applying, in the context of compliance with the law, intellectual property rights (including technology transfer), product certification methodology, principles, norms and values of the code of professional ethics within its own rigorous, efficient and responsible work strategy<br><br>CT2. Identify roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The discipline aims to familiarize students in specialization with issues related to the use of digital integrated circuits, their functions, characteristics and parameters depending on the integrated families to which they belong. |
| 7.2 Specific objectives | • The course aims to present the basic characteristics of digital circuits - both made with discrete components and made with integration technologies.<br>• Bipolar technologies are studied in the order of their historical appearance<br>• The course aims at acquiring knowledge on how to operate and use the components within the digital circuit families<br>• Laboratory: Tracking the signal values in the different measuring points - at the level of discrete circuits, as well as at the level of integrated circuits |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1 METHODS OF PULSE CIRCUIT ANALYSIS. Methods for analyzing switching circuits. RC filter goes down. RC filter switches up<br>Chapter 2. LOGIC CIRCUITS. Elements of logical algebra. Parameters of logic circuits with discrete components. Methods for designing logic circuits with discrete components. Elementary logic circuits with components. Diode logic circuits. Logic circuits with diodes and transistors<br>Chap.3. PARAMETERS OF INTEGRATED LOGIC CIRCUITS. Static transfer characteristic. Protection edge against disturbances. Load factors. Switching speed. Power consumption.<br>Chap.4. LOGIC CIRCUITS INTEGRATED WITH DIODES AND TRANSISTORS (RTL). RTL fundamental gate. RCTL series.<br>Chapter 5 LOGIC CIRCUITS INTEGRATED WITH DIODES AND TRANSISTORS (DTL). The fundamental gate. DTL gate with control transistors. Realization of the wired | • Free course presentation with video projector / overhead projector and blackboard in an interactive way: punctuate from time to time questions for students in order to increase the degree of interactivity<br>• Indication of topics for documentation and individual study | 28 hours |

| | | |
|---|---|---|
| logic function. HTL high threshold DTL gate. Gate YES OR NO<br>Chapter 6 INTEGRATED LOGIC CIRCUITS TTL. TTL standard series. TTL fundamental gate parameters. Static transfer characteristic. Input feature. Output feature. Variation of temperature parameters. Noise margin. Load factor. Power dissipated. Propagation times. Rules for using TTL ports. Evolution of TTL integrated circuits. TTL integrated circuits. SI gate. Gate OR NOT. Gate OR. Gate YES OR NO. Expandable SI-OR-NOT gate. TTL gate with empty collector. Control circuits. Fast TTL series. Low power TTL series. TTL series with Schottky diodes. TTL series with low power Schottky diodes. Advanced TTL Shottky series. TTL family of integrated circuits. TTL series with three states (TSL). Interface circuits. Line transmitters and receivers. Standard series interconnection. Gates of very high power<br>Chapter 7 LOGIC CIRCUITS WITH MOS TRANSISTORS. NMOS logic circuits. CMOS logic circuits. CMOS inverter | | |

Bibliography


- Course notes (slides) made available to students in electronic format on the Office 365 platform
- Popescu Daniela E., Popescu Corneliu - Elementary computing circuits, Matrix Rom Bucharest, ISBN 973-685-123-0
- Popescu C., D. Filipas, H. Dragan, Design with Altera of digital circuits, University of Oradea Publishing House, ISBN 973-613-707-4, 2004
- Stratulat M, D.E.Popescu, Poszet Otto, Digital Circuits, University of Oradea Publishing House, ISBN 973-613-707-4, 2004
- M. Morris Mano, Michael D. Ciletti, Digital Design, Prentice Hall, ISBN-10: 0132774208 • ISBN-13: 9780132774208, 2013
- Ardelean I s.a., CMOS integrated circuits, user manual, IPTV Timisoara, 1989
- The material dep on Mobweb related to the slides from the course, respectively to the laboratory works
- R.P. Jain, Modern digital electronics, 2010, Tata McGraw-Hill Education, Amazon Books
- Jan M. Rabaey, Digital Integrated Circuits A Design Perspective, A Prentice-Hall Publication, http://bwrc.eecs.berkeley.edu/Classes/IcBook/


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Presentation of the laboratory, labor protection norms and conventional signs specific to the field of computer systems - general, generalities regarding the architecture of computer systems.<br>2. Introduction to Quartus II<br>3. Logic Gates<br>4. Equality detector<br>5. Multiplexers and Counters<br>6. 7-segment decoder<br>7. Recovery of laboratories and conclusion of the situation. | Students receive laboratory papers at least one week in advance, study them, inspect them, and take a theoretical test at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher.<br>Operation with ALTERA | Each 2 hours are allocated for each of the 7 detailed points of the laboratory activity |

Bibliography


1. Notite de curs (slide-uri) puse la dispozitie studentilor in format electronic pe platforma Office 365,
2. Stratulat M, D.E.Popescu, Poszet Otto, Circuite digitale, Editura Universităţii din Oradea, ISBN 973-613-707-4, 2004

3. Platforma Office 365 cu lucrarile de laborator

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer and Information Technology specializations and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc. ), and knowledge of the architecture and organization of computer systems as well as their operation and design is a stringent requirement of employers in the field (Rds & Rcs, Plexus, Neologic, Celestica, Keysys, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5) in accordance with the minimum performance standard:<br>- it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br><br>For 10:<br>- for grade 10, a thorough knowledge of all is required | The evaluation can be done face to face or online depending on the situation imposed | 70% |
| 10.6 Laboratory | - for note 5, the broad outline knowledge of the logic circuit families, with their own characteristics, respectively the specific parameters without presenting details on their implementation<br>Specifically: For grade 5: correct answer to at least 1 question out of 3 for each paper.<br>- for grade 10, the detailed knowledge of the practical realization of all the operators of the studied families<br>Specifically: For grade 10: correct answer to all questions | **Test + practical application**<br>At each laboratory students receive a test and a grade. Also, each student receives a note for the activity at the laboratory during the semester and for the file with the laboratory works. This results in an average for the laboratory.<br><br>The questions are asked based on the reports prepared in the laboratory works. | 30% |
| 10.8 Minimum performance standard:<br>Assimilation of detailed knowledge about the construction, operation and design of central processing units for digital computers, as well as about the organization of different types of memories associated with them.<br>The studied design methods are exemplified on existing architectures, including the study of special architectures.<br>The term solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level.<br>Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, own research related to learning (library, internet), cultivating a discipline of work, done correctly and on time | | | |

**Completion date:**
08.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Computer Graphics Elements** | | | | |
| 2.2 Holder of the subject | | | **Pater Alexandrina Mirela** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **Pater Alexandrina Mirela** | | | | |
| 2.4 Year of study | II | 2.5 Semester | 3 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | FD - Field Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/1 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/14 |
| Distribution of time | | | | | hours |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 18 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 10 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 10 |
| Tutorials | | | | | 2 |
| Examinations | | | | | 4 |
| Other activities. | | | | | |
| **3.7 Total of hours for individual study** | **44** | | | | |
| **3.9 Total of hours per semester** | **100** | | | | |
| **3.10 Number of credits** | 4 | | | | |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer. The course can be held face to face or online. |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that are connected to the Internet and dedicated software installed.<br>The laboratory / project can be held face to face or online |

| | |
|---|---|
| | |
| **6. Specific skills acquired** | |
| Professional skills | CP1. Operating with scientific, engineering and informational fundaments<br>CP3. Solving problems using computer science and engineering instruments |
| Transversal skills | CT2. Identifying, describing and carrying out the processes in project management, taking over the different roles in the team and clearly and concisely describing, verbally and in writing, the results in the field of activity. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The course aims to guide students if they want to make a graphics program, to know how to put the problem correctly and to know the functions and techniques specific to this field. The presentation of general concepts and notions is followed by the presentation of transformations that can be applied to 2D and 3D objects. The basic spatial and plane geometric transformations are presented. The most commonly used projections are also presented to make it possible to view the 3D model in a 2D window. The framing of the image in the observation volume (3D-Clipping) and the framing in the viewing window (2D Clipping) are not ignored. |
| 7.2 Specific objectives | **Theoretical knowledge:**<br>• Adequate use in professional communication of the concepts of computability, complexity, programming paradigms and modeling of computing and communications systems<br>• Using interdisciplinary knowledge, solutions and tools, conducting experiments and interpreting their results<br>• To know the fundamental concepts of computer graphics<br>• To know the graphical facilities offered by the C ++ programming language<br>• To understand and know the specific functions and techniques of this field, the fundamental spatial (3D) and plane (2D) geometric transformations, the methods of making projections, to make it possible to visualize the 3D model, in a 2D window, the main methods of image synthesis<br>**Skills acquired:**<br>• Development and implementation of IT solutions for concrete problems<br>• Master and use the graphical features offered by the C ++ and Processing programming language<br>• To use in the creation of computer graphic applications the mathematical support implemented in the functions and techniques specific to the field<br>• Solve various problems using 3D and 2D fundamental geometric transformations<br>• Solve different applications using projection methods to make it possible to view the 3D model in a 2D window<br>• Solve different applications using the main methods of image synthesis<br>• Evaluate and justify the effectiveness of methods chosen for implementation and adopt optimal solutions from different points of view |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introductory notions | Powerpoint presentation with the help of the video projector; free discussions; | 1 hours |
| 2. Graphic equipment | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |

| | | |
|---|---|---|
| 3. Graphic geometric primitives | Powerpoint presentation with the help of the video projector; free discussions; | 1 hours |
| 4. Coordinate systems | Powerpoint presentation with the help of the video projector; free discussions; | 1 hours |
| 5. Geometric transformations | Powerpoint presentation with the help of the video projector; free discussions; | 1 hours |
| 6. Fundamental transformations | Powerpoint presentation with the help of the video projector; free discussions; | 6 hours |
| 7. Projections<br>7.1 Parallel projections<br>7.2 Perspective projections | Powerpoint presentation with the help of the video projector; free discussions; | 5 hours |
| 8. Clipping transformations<br>8.1 Clipping for points<br>8.2 Clipping for lines<br>8.3 Clipping for polygons | Powerpoint presentation with the help of the video projector; free discussions; | 6 hours |
| 9. Visualization transformations<br>9.1 2D visual transformations<br>9.2 3D visualization transformations<br>9.3 The 3D visualization system | Powerpoint presentation with the help of the video projector; free discussions; | 4 hours |
| 10. Methods of image synthesis | Powerpoint presentation with the help of the video projector; free discussions; | 1 hours |

Bibliografy


1. Vasile Baltac şi colectivul, *Calculatoarele electronice, grafica interactivă şi prelucrarea imaginilor,* Editura Tehnică, Bucureşti, 1985
2. Dorian Dogaru, *Elemente de grafică 3D,* Editura ştiinţifică şi enciclopedică, Bucureşti, 1988
3. Dana Petcu, Lucian Cucu, *Principii ale graficii pe calculator,* Editura Excelsior, Timişoara, 1995
4. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, *Computer Graphics: Principles and Practice in C* (2nd Edition), 1995
5. Hughes, Van Dam, Mcguire, Sklar, Foley, Feiner, Akeley Aw, *Computer Graphics: Principles and Practise* , 2009
6. Steve Marschner e Peter Shirley, *Fundamentals of Computer Graphics, Fourth Edition* , 4ª ed., AK Peters/CRC Press, 15 dicembre 2015, ISBN 9781482229394
7. www.processing.org
8. Alan Watt, *3D Computer Graphics* (3rd edition), Addison-Wesley, 2000.
9. Mirela Pater, *Elemente de grafică pe calculator,* Editura Universităţii din Oradea, Oradea, 2002
10. Mirela Pater, *Principii ale graficii pe calculator,* Editura Universităţii din Oradea, Oradea, 2008
11. Mirela Pater, *Elemente de grafică pe calculator* - slides, format electronic, 2013

https://uoradea-my.sharepoint.com/personal/alexandrina_pater_didactic_uoradea_ro/_layouts/15/start.aspx#/default.aspx?RootFolder=%2Fpersonal%2Falexandrina_pater_didactic_uoradea_ro%2FDocuments%2FEGC&FolderCTID=0x0120007BA764452C16D943BCAFC2070C435E5C&View={FD3D038C-0867-44C7-B0FC-F01A185020B1}


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|

| | | |
|---|---|---|
| Labor protection training<br>Presentation of the Processing language | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Graphic modes. Coordinate transformations. Graphic primitives - Graphic procedures and functions of the processing language | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Image, painting and text processing in processing | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Fundamental Transformations - Implementation 2D Scaling, 2D Translation, 2D Rotation, 2D Shearing, Parallel Projections and Perspective | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Animations and interactions in processing | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Clipping transformations - Clipping for points, Clipping for lines, Clipping for polygons | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| 3D graphic primitives in Processing | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Final test | | 2 hours |
| 8.3 Academic project | Teaching methods | No. of hours/ Observations |
| Fundamental Transformations - Implementing Scaling, Translation, Rotation, Shearing and 3D Projections in Processing | Applications - programs;<br>Assistance in using software development; | 14 hours |

Bibliograpy


- Mirela Pater, *Principii ale graficii pe calculator,* Editura Universităţii din Oradea, Oradea, 2008
- Cristian Tiurbe, Mirela Pater, *Elemente de grafică pe calculator*, îndrumător de laborator, Editura Universităţii din Oradea, 2014 https://uoradea-my.sharepoint.com/personal/cristian_tiurbe_didactic_uoradea_ro/_layouts/15/start.aspx#/Documents/EGC%20-%20Lab
- Alan Watt, *3D Computer Graphics* (3rd edition), Addison-Wesley, 2000.
- Hughes, Van Dam, Mcguire, Sklar, Foley, Feiner, Akeley Aw, *Computer Graphics: Principles and Practise* , 2009
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- www.processing.org
- James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, *Computer Graphics: Principles and Practice in C* (2nd Edition), 1995

- www.processing.org
- https://www.youtube.com/watch?v=2VLaIr5Ckbs&list=PLzJbM9-DyOZyMZzVda3HaWviHqfPiYN7e

https://www.youtube.com/user/shiffman

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

The content of the discipline is found in the curriculum of Computer and Information Technology specialization from other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.), and knowing the basic principles of operating a computer system, knowing its main components and implementing the components of hardware, software and communication systems, carrying out projects in areas of knowledge are stringent requirements of employers in the field (Qubiz, DecIT, Accesa, Fortech, Diosoft, Five Tailors, etc.)

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: Knowledge Understanding | Written paper<br>The evaluation can be done face to face or online | 34% |
| 10.5 Academic seminar | - | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10:Knowledge and understanding;Ability to explain and interpret;Complete and correct solution of the requirements. | - Laboratory / practical works<br>-Tests during the semester<br>The evaluation can be done face to face or online | 33% |
| 10.7 Project | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10:Knowledge and understanding;Ability to explain and interpret;Complete and correct solution of the requirements. | The evaluation can be done face to face or online | 33% |
| 10.8 Minimum performance standard:<br>Selection and independent use of learned methods and algorithms for known standard situations as well as completion of calculations.<br>Development and implementation of algorithms using learned principles. | | | |

| |
|---|
| The timely solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Modeling a typical engineering problem using the formal apparatus characteristic of the field. |

**Completion date: 5.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Object Oriented Programming** | | | | |
| 2.2 Holder of the subject | | | **Prof.univ.dr.ing. Zmaranda Doina** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **Prof.univ.dr.ing. Zmaranda Doina** | | | | |
| 2.4 Year of study | **II** | 2.5 Semester | **4** | 2.6 Type of the evaluation | **Ex**. - Examination | 2.7 Subject regime | **FD -** Field Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **2** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 12 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 10 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **44** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | Basic programming skills |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - the course can be held face to face (classroom equipped with computer and video projector) or online; slide-based presentation<br>- attendance at least 50% of the course |
| 5.2.for the development of the academic seminary/laboratory/project | - the laboratory can be held face to face (laboratory room equipped with computers and .NET platform / Visual Studio) or online<br>- mandatory presence at all laboratories<br>- a maximum of 4 laboratory works can be recovered during the semester (30%);<br>- the frequency of laboratory hours below 70% leads to the re-done the discipline |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | **CP2.** Design of hardware, software and communications components<br><br>**CP3**. Problem solving using computer science and engineering tools<br><br>**CP5**. Design, life cycle management, integration and integrity of hardware and communications systems |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The objective of the discipline is to acquire knowledge and to familiarize students with design and implementation methods of software applications using object-oriented approach |
| 7.2 Specific objectives | ▪ Starting from the basic concepts of object-oriented programming: encapsulation, inheritance and polymorphism, the course develops and presents advanced concepts such as generic and abstract classes, interfaces, collections of objects, events and delegates, attributes and mechanism of reflection, serialization and multithreading programming. The examples were developed in the C# language, but without restricting the generality of the presented concepts. At the end of the course, some concepts related to access to databases and the concept of an ORM were presented.<br>▪ The laboratory, developed using the C# language and .NET platform / Visual Studio platform familiarizes students with practical aspects of solving different types of implementation problems using the concepts of object programming |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Programming paradigms. Basic OOP concepts in C#: classes and objects; namespaces | Presentation of the course concepts and examples on slides, face to face or online | 2 |
| Encapsulation and access control. | | 2 |
| Constructors and destructors. Reference types and value types. Static members. Partial classes. | | 2 |
| Inheritance. Polymorphism. | | 4 |
| Abstract classes. Generic classes. | | 2 |
| Collections of objects. .NET collections: generic collections and non-generic collections. Using LINQ to objects | | 2 |
| Interfaces. MicroSoft .NET interfaces | | 2 |
| Serialization. Binary serialization and XML serialization. Handling XML files | | 2 |
| Events and delegates. Lambda expressions | | 2 |
| Attributes and the mechanism of reflection | | 2 |
| Multithreading programming. | | 2 |
| Access to databases through ADO.NET; using an Object Relational Mapper (ORM) - ADO.NET Entity Framework. Mapping in the Entity Framework; context objects. | | 4 |

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4. Christian Nagel – C# and .NET 2021 Edition, Wiley & Sons, ISBN: 978-1-119-79720-3, 2021
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6. D. Zmaranda - Proiectarea sistemelor orientate pe obiecte utilizând şabloane de proiectare, Editura Universităţii,din Oradea, ISBN 978-606-10-0427-0, 332pg., 2011
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8. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, Professional C# 4.0 and .NET 4 (Wrox Programmer to Programmer), ISBN 978-0-470-50225-9, Wiley Publishing 2010
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11. https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Frodica%5Fzmaranda%5Fdidactic%5Fuoradea%5Fro%2FDocuments%2FPOO%2FPOO%5Fcurs

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Classes and objects in C#. Class hierarchies. Namespaces | Students receive practical work at least a week in advance, and study it. At the beginning of the laboratory, possible implementation solutions for the proposed applications are discussed. Afterwards, the students start implementations (the proposed problems from each laboratory) under the guidance of the teacher. | 2 |
| Constructors and destructors. Abstract classes. | | 2 |
| Inheritance and class hierarchy. Methods/constructors overloading. | | 4 |
| Polymorphism and dynamic binding. | | 2 |
| Collections of objects. Non-generic .NET collections. | | 2 |
| Generic classes and .NET generic collections. | | 2 |
| Interfaces | | 4 |
| Serialization | | 2 |
| Events and delegates. Event programming. | | 2 |
| Access to databases using ADO.NET | | 2 |
| Laboratory evaluations and final assessment | | 4 |

Bibliography

1. D.Zmaranda, A. Nicula, Elemente de programare orientată pe obiecte în limbajul C# - îndrumător de laborator, Editura Universităţii din Oradea, ISBN 978-973-759-523-2, 2008– updated electronic version 2022
2. https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Frodica%5Fzmaranda%5Fdidactic%5Fuoradea%5Fro%2FDocuments%2FPOO%2FLAB%5FPOO

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computers specialization in other university centers that have accredited these specializations (Politehnica University of Timisoara, Bucharest Polytechnic University). Knowledge of the basic concepts of object-oriented programming together with their application in the development of software applications, presented within this discipline, represent a fundamental requirement in order to form the necessary programming skills and abilities that were requested by software companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: correct answers gathering 50 points in total are required (40 from questions + 10 points ex officio)<br>For 10: the correct answer to all the questions in the proposed topic is required (100 points) | **Written exam** - the assessment can be done face to face or online<br>Students receive for solving a a quiz with several questions, each question tests the mastery of the theoretical concepts presented in the course. Each question has a score; in total, the questions total 90 points; 10 points are awarded ex officio. | 40 % |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: achieving a functional implementation in proportion of 50% of the applications proposed in the laboratory<br>For 10, detailed knowledge of how to implement all laboratory problems and 100% functional implementation is required | **Practical application** - evaluation can be done face to face or online.<br>At each laboratory, students are evaluated based on their activity (answers to questions, implementation proposals, etc.), evaluations that is finalized at the end of the laboratory by a mark for all activity during the semester. Also, in the last hours of the laboratory, the students were evaluated based on all practical implementation that were given to them during the semester. The average between the mark received from practical evaluation and the mark obtained from the laboratory activity will represent the final mark at the laboratory. | 60 % |

10.8 Minimum performance standard:

Course:

- understanding the basic and advanced concepts in object-oriented programming, namely: encapsulation, inheritance and polymorphism, together with structures underlying the implementation of these concepts: classes (including generic classes and abstract classes), interfaces, virtual functions, the mechanism of overloading of functions and operators and other
- getting used to other advanced concepts such as serialization of objects, use of threads, attributes, reflection mechanism

Laboratory:

- acquiring practical skills and learning how to develop and implement software applications using object-oriented approach
- familiarization with usage of MicroSoft Visual Studio platform and .NET platform to develop object-oriented applications in the and C# programming language
- applying the principle of code reuse by using the different existing class libraries in the implementation of object-oriented software applications

**Completion date:** 07.09.2022

**Date of endorsement in the department:** 21.09.2022

**Date of endorsement in the Faculty Board:** 23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **[1] Computers and information technology** |
| 1.4 Field of study | **[2] Computers and information technology** |
| 1.5 Study cycle | **[3] Bachelor** |
| 1.6 Study program/Qualification | **[4] / [5] Information Technology** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **[6] Logic design 1** | | | |
| 2.2 Holder of the subject | | | | Conf.dr.ing.Novac Ovidiu | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | Associate assistant Silviu Taut | | | |
| 2.4 Year of study | I | 2.5 Semester | I | 2.6 Type of the evaluation | [7] Ex | 2.7 Subject regime | [8] FD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 1/1/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 14/14/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 20 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 18 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 14 |
| Examinations | 8 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **74** |
| **3.9 Total of hours per semester** | **130** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector - Attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | Room equipped with computers and specific programs - Mandatory attendance at all laboratories; - A maximum of 3 works can be recovered during the semester (20%); |
| **6. Specific skills acquired** | |

| | |
|---|---|
| Professional skills | C2. Advanced hardware and software design of computing systems.<br>• Operating with the fundamentals of mathematics, engineering and computer science.<br>• Design of hardware components<br>• Solving problems using computer science and engineering tools<br>• Improving the performance of hardware systems |
| Transversal skills | CT1. Honorable, responsible, ethical conduct in the spirit of the law to ensure the reputation of the profession |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Introduction to Boolean algebra<br>▪ Initiation in the analysis and synthesis of the main categories of combinational circuits. initiation into the theory and practice of logic devices and circuits;<br>▪ acquiring the practical skills necessary for the analysis of logical schemes, of the logical design of some combinational circuits that are the basis of the complex architectures of the computer systems; |
| 7.2 Specific objectives | • using the computer in order to design the circuits, to verify from a functional point of view the designed scheme |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| CHAPTER 1. Boolean algebra. Its application to the study of switching circuits.<br>Definition of Boolean algebra. Inverter circuit.<br>The transfer function of a switching circuit. Operations with functions. Normal disjunctive expression. Normal conjunctive expression.<br>Complete operating systems. Modes of representation. Dual expressions. Classes of Boolean functions. Autodual functions | • Powerpoint presentation;<br>• free discussions; | 2<br><br><br><br>2 |
| CHAPTER 2 Minimizing switching functions. The method of minimization using the axioms and theorems of Boolean algebra. Minimization diagram method.<br>Minimum disjunctive form. Minimum conjunctive form. Using the diagram method to minimize incompletely defined switching functions.<br>Minimize functions with more than four variables. Condensation of minimization diagrams.<br>Quine - Mc Cluskey method<br>Minimization of Boolean function systems | • Powerpoint presentation;<br>• free discussions; | 2<br><br>2<br><br>2<br><br><br>2 |
| CHAPTER 3. Analysis of combinational circuits with gates or logic elements.<br>Synthesis of combinational circuits with gates or logic elements. Analysis of logic networks with NAND or NOR circuits.<br>Synthesis of networks with logical elements. Synthesis of two-level networks. Synthesis of two-tier networks with NAND elements. Synthesis of circuits with NOR elements. | • Powerpoint presentation;<br>• free discussions; | <br><br>2 |
| CHAPTER 4. Examples of combinational logic circuits.<br>The summation circuit for a rank. Adder for several ranks. | • Powerpoint presentation; | 2 |

| | | |
|---|---|---|
| Selector circuit (multiplexer). Distributor circuit (demultiplexer).<br>Code converter. The decoder.<br>The encoder. Numerical comparators. Parity detector and generator.<br>Programmable logic areas. Minimizing programmable logic areas | • free discussions | 2<br><br>2 |
| CHAPTER 5. Sequential circuits.<br>Elementary sequential circuits. Synchronous RS type CBB.<br>Synthesis of the tilting circuit D with synchronous RS. J-K flip-flop circuit. J-K flip-flop circuit "MASTER - SLAVE". Synthesis of sequential circuits | • Powerpoint presentation;<br>• free discussions | 2<br><br>2 |
| CHAPTER 6. Counters.<br>Asynchronous counter module 2n. Asynchronous counter modulus $M \neq 2^n$.<br>Synchronous counters. Synchronous binary decimal counter.<br>Reversible counter. Counter without asynchronous inputs | • Powerpoint presentation;<br>• free discussions | 2<br><br>2 |
| Bibliography<br>1. Mang Gerda Erica, Analiza şi sinteza circuitelor logice – circuite combinaţionale, Editura Universităţii din Oradea, ISBN 973-8219-96-5, 2001<br>2. Mang Gerda Erica, Analiza şi sinteza circuitelor logice – circuite secvenţiale, Editura Universităţii din Oradea, ISBN 973-8083-72-9, 2000<br>3. Mang Gerda Erica, Ppt. – slide-uri, 2012<br>4. Mang Gerda Erica, Ppt. – slide-uri, 2010<br>5. John M. Yarbrough, Digital Logic – Applications and Design, West Publishing Company, 1997 | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Seminar | | |
| Boolean algebra - Application of axioms and theorems of Boolean algebra<br>Forms of expression of Boolean function<br>Function minimization - Veitch-Karnaugh diagram.<br>Function minimization - Quine-Mc.Kluskey method<br>Function minimization - Minimize function systems.<br>Analysis and synthesis of combinational logic schemes.<br>Implementation of functions using multiplexers | introductory lecture; free discussions; solving exercises | 2<br>2<br>2<br>2<br>2<br>2<br>2 |
| Laboratory | | |
| Introducing the Xilinx program. Making a device for choosing the optimal path.<br>One-bit adder.<br>8-bit adder.<br>7-segment decoder.<br>Multiplexer circuit.<br>Code converter.<br>Parity generator | Tests. Discussions. Individually work and also in small groups of students. | |
| Bibliography<br>Mang E., Mang I., C.Popescu., Proiectarea logica a circuitelor combinationale. Aplicatii, 2010 Editura Universităţii din Oradea, ISBN978-606-10-0328-0, 122pag<br>Mang Gerda Erica, Analiza si Sinteza circuitelor logice – Circuite combinationale. ISBN: 978-606-10-13478-4, 2014<br>Mang Gerda Erica, Popescu Constantin, Proiectare logica cu circuite FPGA – partea I, Universitatea din Oradea, 60 pg, 2006, actualizat in format electronic 2012,<br>Dave Van den Bout, Practical Xilinx Designer Lab Book, Prentice Hall, 1997<br>Xilinx, Lab Projects Documentation, Foundation Series Express, Documentatie Xilinx, 2018 | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is adapted to the requirements of specialized companies

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: the correct solving of all the subjects at the exam, the presence and activity at courses | Final course evaluation and problem solving | 60% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>For 10: the presence and activity at seminars, performing all laboratory work | answers and tests during the semester | 20% |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10: the presence and activity at seminars, | Weekly evaluation of the laboratory preparation<br>Tracking the activity along the way, practical applications. | 20% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course:<br>Academic seminar:<br>Laboratory:<br>Project: | | | |

**Completion date:**
01.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:
- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems
- Electromechanics
- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications

B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:
A. For Bachelor study programs:
- GD - General Discipline

- FD - Fundamental Discipline
- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice

B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **[1] Computers and information technology** |
| 1.4 Field of study | **[2] Computers and information technology** |
| 1.5 Study cycle | **[3] Bachelor** |
| 1.6 Study program/Qualification | **[4] / [5] Information Technology** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **[6] Logic design 2** | | | |
| 2.2 Holder of the subject | | | | Prof. Erica Mang | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | assistant professor POSZET OTTO | | | |
| 2.4 Year of study | I | 2.5 Semester | II | 2.6 Type of the evaluation | [7] Ex | 2.7 Subject regime | [8] FD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 1/1/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/ 14 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 20 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 18 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 14 |
| Examinations | 8 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **74** |
| **3.9 Total of hours per semester** | **130** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector - Attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | Room equipped with computers and specific programs - Mandatory attendance at all laboratories; - A maximum of 3 works can be recovered during the semester (20%); |
| **6. Specific skills acquired** | |

| | |
|---|---|
| Professional skills | C2. Advanced hardware and software design of computing systems.<br>• Design of hardware components using specific design methods<br>• Problem solving using computer science and engineering tools<br>• Description of the structure and operation of hardware, software and communications components<br>• Explaining the role, interaction and operation of hardware, software and communications system components<br>• Evaluation of the functional and non-functional characteristics of the hardware components, based on some metrics<br>• Improving the performance of hardware systems |
| Transversal skills | CT2. Identifying, describing and carrying out the processes in project management, taking over the different roles in the team and clearly and concisely describing, verbally and in writing, in Romanian and in a language of international circulation, the results in the field of activity.<br>• Honorable, responsible, ethical conduct in the spirit of the law to ensure the reputation of the profession.<br>• Identifying, describing and carrying out the processes in project management, taking over the different team roles and clearly and concisely describing, verbally and in writing, in Romanian and in a language of international circulation, the results in the field of activity.<br>• Demonstrating the spirit of initiative and action to update professional, economic and organizational culture knowledge. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ mastering the methods of designing sequential circuits and mastering the use of programmable logic circuits used in modern design.<br>▪ Initiation in the analysis and synthesis of sequential circuits.<br>▪ acquiring the practical skills necessary for the logical design of sequential circuits that underlie the complex architectures of computing systems;<br>▪ acquiring the knowledge necessary for modeling and simulating numerical systems using high-level hardware description languages;<br>▪ mastering the basic elements of the VHDL language, as a representative hardware description language;<br>▪ mastering structured design techniques for computing systems using the VHDL language;<br>▪ implementation of complex applications using programmable logic circuits (FPGA) |
| 7.2 Specific objectives | • using the computer in order to design the circuits, to verify from a functional point of view the designed scheme.<br>• Learning the VHDL language |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| CHAPTER 7. Sequential circuits with control inputs.<br>Models of representation of sequential circuits. Connection matrix. Transition matrix.<br>Automatic transformation. Regular expressions. Non-deterministic transition graph. Recognition of regular events by non-deterministic transition graphs.<br>Transforming the nondeterministic graph into a state diagram.<br>Reducing the number of sequential circuit states. Coding of states.<br>Method of assignment by state partition. | • Powerpoint presentation;<br>• free discussions; | 8 |
| CHAPTER 8. Synthesis of asynchronous sequential circuits. | • Powerpoint | 4 |

| | | |
|---|---|---|
| Reducing the number of states. Coding of states.<br>Circuit analysis in terms of critical strokes. Static chance. Dynamic chance | presentation;<br>• free discussions; | |
| CHAPTER 9. Synthesis of synchronous sequential circuits. Adder in one clock. Adder in two clocks. Clock pulse generator. Order register. Synthesis of a synchronous sequential scheme that performs elementary operations.<br>Algorithms for performing arithmetic operations in fixed point systems. Referral to D.C.R. in the complementary code. Number shift operation. Multiplication operation. | • Powerpoint presentation;<br>• free discussions; | 6 |
| CHAPTER 10. Hardware description languages. Introduction.<br>VHDL language development;<br>Features of the VHDL language; | • Powerpoint presentation;<br>• free discussions | 2 |
| CHAPTER 11. Basic concepts in VHDL<br>The entity; Architecture; Packages; | • Powerpoint presentation;<br>• free discussions | 2 |
| CHAPTER 12. Basics of the VHDL language.<br>VHDL language constructions; Objects; Data types; Predefined types; Types not supported by Foundation Express; VHDL operators; | • Powerpoint presentation;<br>• free discussions | 4 |
| CHAPTER 13. VHDL language instructions.<br>Sequential instructions; Concurrent instructions | • Powerpoint presentation;<br>• free discussions | 2 |
| Mang Gerda Erica, *Proiectarea circuitelor logice in VHDL. Exemple*. 230 pg, ISBN: 978-606-10-1377-7, 2014<br>Mang Gerda Erica, *Probleme de proiectare logica*, Ed. Universităţii din Oradea, ISBN 978-606-10-0290-0, 250 pag, 2010<br>Mang Gerda Erica, *Analiza şi sinteza circuitelor logice – circuite secvenţiale*, Editura Universităţii din Oradea, ISBN 973-8083-72-9, 2000<br>Mang Gerda Erica, *VHDL*, Ed. Universităţii din Oradea, 973-613-485-7, 260 pg, 2004, actualizat in format electronic – 2013<br>Adrian G. Moise , Tehnologia proiectarii in VHDL, Editura Matrix, ISBN:978-973-755-213-6, 2011<br>G. Toacse, D. Nicula - Electronică Digitală. Dispozitive, Circuite, Proiectare (I), Verilog HDL (II). Editura TEHNICĂ, Bucuresti, 2005<br>John M. Yarbrough, Digital Logic – Applications and Design, West Publishing Company, 1997 | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Laboratory | | |
| VHDL design language. The entity. Architecture. Package. SETTINGS<br>Constructions of the VHDL language. Objects. Data types. VHDL operators. Sequential instructions. Concurrent instructions.<br>Basic elements of the VHDL language. Description of some elementary sequential circuits in VHDL<br>registers<br>4-bit adder<br>Synchronous counters. Asynchronous counters.<br>Synthesis problems | Tests.<br>Discussions.<br>Individually work and also in small groups of students. | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>2 |
| project | | |
| Adders; Multipliers; Register; Multiplexers - applications;<br>Encoders; Memories; Counting; | Discussions.<br>Individually work and also in small groups of students. | 14 |
| Bibliography | | |

Mang Gerda Erica, Popescu Const., Analiza si sinteza circuitelor logice – culegere de probleme, Editura Universităţii din Oradea, ISBN 973-613-267-7, 2002
Mang Gerda Erica, Tirtea Rodica, Proiectarea logica în VHDL – lucrari practice, Universitatea din Oradea, ISBN 973-8083-86-9, 2000
Alexandru Georgescu, Adrian G. Moise, Practica proiectarii in VHDL, Editura Matrixrom, ISBN:978-973-755-397-3, 2011
Frank Vahid, Digital Design with RTL Design, VHDL, and Verilog, ISBN-13: 978-0470531082 ISBN-10: 0470531088, 2010, 575 pag.
James W. Stewart, Chao-Ying Wang - Digital electronics laboratory experiments using the Xilinx XC95108 CPLD with Xilinx design and simulation software, 2nd ed., 304 pag, Published 2004 by Pearson/Prentice Hall in Upper Saddle River, N.J . ISBN 10 0131131249
Dave Van den Bout, Practical Xilinx Designer Lab Book, Prentice Hall, 1997
Xilinx, Lab Projects Documentation, Foundation Series Express, Documentatie Xilinx,2012

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is adapted to the requirements of specialized companies

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: the correct solving of all the subjects at the exam, the presence and activity at courses | Final course evaluation and problem solving | 60% |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10: the presence and activity at seminars, | Weekly evaluation of the laboratory preparation Tracking the activity along the way, practical applications. | 20% |
| 10.7 Project | In order to obtain a grade of 5, the student will have to teach the project in written form, dealing with the proposed topic theoretically and to implement in Xilinx the designed circuit | At the end of the semester the project will be taught and supported. It follows the evolution during the semester, the support of the project, the way of writing. The aim is to develop the ability to work in a team. | 20% |
| 10.8 Minimum performance standard:<br>Course: - Design of elementary circuits<br>Academic seminar:<br>Laboratory: - Knowledge of the design method used<br>Project: - Carrying<br>out projects respecting ethical and responsible behavior; | | | |

**Completion date:**

**Date of endorsement in the department:**

**Date of endorsement in the Faculty Board:**

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:
- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems
- Electromechanics
- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications

B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:
A. For Bachelor study programs:
- GD - General Discipline
- FD - Fundamental Discipline
- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice

B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | **Computers/ Bachelor Engineer** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **User Interface Design** | | | | | |
| 2.2 Holder of the subject | | Assoc..Prof. Eng.PhD. Gabor Gianina | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Assoc.Prof. Eng.PhD. Gabor Gianina<br>Assoc.Prof.Inf. PhD. Elisa Moisi | | | | | |
| 2.4 Year of study | 2nd | 2.5 Semester | 1st | 2.6 Type of the evaluation | Examination | 2.7 Subject regime | Specialized Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 laboratory/project | 1/1 |
| 3.4 Total of hours from the curriculum | 56 | of which: 3.5 course | 28 | 3.6 seminar laboratory/project | 14/14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 21 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 30 |
| Tutorials | 4 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | face to face or online<br>projector and access to Internet |
| 5.2.for the development of the academic seminary/laboratory/project | face to face or online<br>every student has access to a computer connected to Internet and with access to the applications/software used during the labs |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | **CP3**. Solving problems using computer science and engineering instruments<br><br>**CP4.** Computer systems design and integration using technologies and programming environments. |
| Transversal skills | **CT3.** Demonstration of initiative and action for updating professional, economic knowledge and organizational culture. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Know and understand how to design and implement an application with a functional complete and usable interface, the methods used to remove useless elements from software applications in order to select the good design ideas and the best way to design and develop a web application. The intent of the course, labs and project is to use HTML5, CSS3, Javascript/jQuery to design and develop the frontend part of a responsive web site |
| 7.2 Specific objectives | ▪ to understand and use the elements of HTML5 in order to design and develop a responsive web site<br>▪ to know how to work and use tables, frames, fonts, control element, lists and forms in HTML5<br>▪ to know how to design and develop interactive web pages with useful and readable content<br>▪ to know how to use in implement audio, video and images in order to develop an interactive web site<br>▪ understand and know how to use stiles and CSS3 elements, Javascript/jQuery for responsive web page development<br>▪ to know and understand how to design and develop a complete frontend part of a web responsive site |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Interfaces -definition and terminology, areas of interest for usable and used interfaces, methods used to develop interfaces, the future of web interfaces<br>New aspects of human-computer interaction, different types of interfaces, methods used to design and develop interfaces | lecture & debate | 2 |
| Interfaces for web applications - special requests and interaction design, design methods and browsing strategies<br>Web site design - web site structure, layout, visual flow, chromatic, content, accessibility, steps used in interactive web design | lecture & debate | 2 |
| HTML5 - new elements used foe web design, new sematic elements - text, fields, webmail, numbers, controls<br>HTML5 - forms and forms validation, microdata, events &information, speech | lecture &debate | 2 |
| HTML5 – canvas 2D, canvas 3D and inline SVG<br>HTML5 - audio & video elements, videos on pe web<br>HTML 5 – native drag and drop, desktop drag, web socket, messaging, web workers, device orientation, geolocation | lecture & debate | 2 |
| CSS3 - definition, anathomy of a line style, style types, selectors used<br>CSS3 - webfonts, text wrapping, columns, opacity, rounded corners, gradient, shadows, background, border image, flexible box, 2D and 3D transforms, | lecture & debate | 2 |

| | | |
|---|---|---|
| animations, transitions, multiple columns, user interface | | |
| JavaScript - syntax and reserved word, data types - number, string, boolean, object, null, undefined, NaN, Infinity; strings and methods used for strings, operators, control elements – if...else, switch, while, do...while,for, try...catch...finaly ; objects, arrays, functions, classes. JavaScript & HTML5 - inserting images and slide-shows | lecture & debate | 2 |
| Responsive web design – definition, required elements, steps used to design and develop responsive design pages, advantages and disadvantages. Responsive web design pages - case studies | lecture & debate | 2 |
| Responsive web design & framework-uri. Bootstrap and responsive web design - system grids, typography, tables, lists, groups, images, video elements. | lecture & debate | 2 |
| User interfaces - interface views, interaction design, interface realities in the design proccess, user types, utilizability rules, design models and methods/methodologies used to design interface, standards and regulations | lecture & debate | 2 |
| Human capacities. Desktop application / vizual design - elements, aspects, dimensions, rules, strategies, visual flow, interface structure | lecture & debate | 2 |
| Mobile phone interfaces - evolutionm control web elements, interfaces, design concepts.. Methods used to design and develop a web site for mobile phones. | lecture & debate | 2 |
| Comparative study regarding the design and development of a interface for a desktop and mobile device. Update and maintenance of web pages. | lecture & debate | 2 |
| JavaScript/jQuery – syntax, selectors, jQuery & HTML, jQuery & CSS methods, events, attibutes. JavaScript/jQuery mobile – basic structure, page data roles, basic lists, list view role, links between pages, pick and use implicit themes, virtual pages, page navigation, dialogs, buttons, symbols, toolbars, forms elements, events | lecture & debate | 2 |
| Search Engine Optimization (SEO) techniques. Web site architecture and SEO optimization. | lecture & debate | 2 |

Bibliography


Ned Snell, *Crearea paginilor Web,* Editura Teora, Bucuresti, 2002

Gianina GABOR, *Grafica si proiectarea interfeţei utilizatorului*, Editura Universităţii din Oradea, 2004

S. Buraga, *Tendinţe actuale în proiectarea şi dezvoltarea aplicaţiilor Web*, Editura Matrix Rom, Bucureşti, 2006

D. Saffer, *Designing for Interaction: Creating Smart Applications and Clever Devices* , Peachpit Press, 2006

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Mark Pilgrim, *HTML5: Ghidul incepatorului*, 3D Media communications – traducere „Dive into HTML5", Brasov, 2011

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Gianina GABOR, *Proiectarea interfetelor utilizator,* curs, format electronic

J.W.Satzinger, R.B.Jackson, S.D.Burd, *Introduction to Systems Analysis and Design: An Agile Iterative Approach*, 6th edition, Cengage Technology Edition, 2014

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http://mobile.smashingmagazine.com/2010/07/19/how-to-use-css3-media-queries-to-create-a-mobile-version-of-your-website/ consultat la 10.06.2014

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Gianina Gabor, Moisi Elisa, "Proiectarea interfețelor utilizator.Teorie și aplicații", Editura Universităţii din Oradea ISBN 978-606-10-1718-8, 2015(carte pe CD )


| 8.3 Laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Interaction design, UX design (user experience), user flow, user flow charts, wireframes and user flow charts, develop wireframes and user flow charts for an existing application | examples and assigned problems | 1 |
| Develop and implement a web site based on an imposed structure and its required design using HTML5 elements | examples and assigned problems | 1 |
| Insert and use new CSS3 elements on the above web site developed according to the design requests | examples and assigned problems | 1 |
| Javascript - insert Javascript elements in the developed web site | examples and | 1 |

| | | |
|---|---|---|
| | assigned problems | |
| Use media queries and fluid grids to develop responsive web pages in the website | examples and assigned problems | 1 |
| Add new responsive pages in the existing web site | examples and assigned problems | 1 |
| Final design elements included in the web site | examples and assigned problems | 1 |
| 8.4 Project | Teaching methods | No. of hours/ Observations |
| Choosing a theme for a 3 level strict hierarchy structure responsive web site | examples and assigned problems | 1 |
| Web design - contextual analysis | examples and assigned problems | 1 |
| Web site design - first design ideas and feedback | examples and assigned problems | 1 |
| Web site design - interactive prototype | examples and assigned problems | 1 |
| Develop the responsive web site - the home page and 2-3 pages of the second level | examples and assigned problems | 1 |
| Develop the responsive web site - insert the pages from the third level from the web site | examples and assigned problems | 1 |
| Final project/web site presentation - PowerPoint presentation and source code | examples and assigned problems | 1 |

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http://mobile.smashingmagazine.com/2010/07/19/how-to-use-css3-media-queries-to-create-a-mobile-version-of-your-website/ consultat la 10.06.2014


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- through the information contained in the lecture and labs the students gain consistent knowledge matching with the required skills

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: in accordance with the maximum performance standard | face to face or online<br><br>written test /assignment | 40% |

| | | | |
|---|---|---|---|
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10: in accordance with the maximum performance standard | face to face or online<br><br>oral based on assignments | 30% |
| 10.7 Project | Minimum required conditions for promotion (grade 6): in accordance with the minimum performance standard<br>For 10: in accordance with the maximum performance standard | face to face or online<br><br>oral presentation of the developed and implemented web site | 30% |
| 10.8 Minimum performance standard:<br>Course: 5<br>Laboratory: 5<br>Project:6 | | | |

**Completion date: 9.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board:23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Data Structures** | | | | |
| 2.2 Holder of the subject | | | **Prof.univ.dr.ing. Zmaranda Doina** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **ş.l.dr.ing. Coman Simina** | | | | |
| 2.4 Year of study | **II** | 2.5 Semester | **3** | 2.6 Type of the evaluation | **Ex**. - Examination | 2.7 Subject regime | **FD -** Field Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **2** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 25 |
| Tutorials | 2 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | Basic programming skills in C/C++ language |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - the course can be held face to face (classroom equipped with computer and video projector) or online; slide-based presentation<br>- attendance at least 50% of the course |
| 5.2.for the development of the academic seminary/laboratory/project | - the laboratory can be held face to face (laboratory room equipped with computers and .NET platform / Visual Studio) or online<br>- mandatory presence at all laboratories<br>- a maximum of 4 laboratory works can be recovered during the semester (30%);<br>- the frequency of laboratory hours below 70% leads to the re-done the discipline |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | **CP1.** Operating with scientific, engineering and computer science foundations<br>**CP2.** Design of hardware, software and communications components<br>**CP3**. Problem solving using computer science and engineering tools |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The objective of the course is to familiarize students with the variety of existing data structures used in programming as well as with their most representative applications. Thus, through the structure of the course and the laboratory, the main objective is to acquire programming skills by knowing and using specific data structures and algorithms in solving specific applications. The course includes a highly applicative component, containing a large number of examples of algorithms in C++ source code, but without restricting the generality of the presented concepts. |
| 7.2 Specific objectives | ▪ The course aims to present different typed of data structures (generalized trees, binary trees, ordered binary trees, AVL trees, B-trees, undirected graphs, directed graphs, weighted graphs) together with the related processing algorithms, as well as the methods in which they can be used to implement different types of applications.<br>▪ The laboratory, based on the C ++ programming language and Visual Studio framework, familiarizes students with practical aspects of solving different types of problems by implementing and adapting specific algorithms and data structures to a given problem |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Introduction to tree data structure. Concepts. Types of trees. | | 2 |
| Generalized tree data structure. Tree transversal: preorder, inorder, postorder. Implementation of generalized trees. | Presentation of the course concepts and examples on slides, face to face or online | 2 |
| Binary trees. Characteristics. Implementation of binary trees. | | 2 |
| Ordered binary trees. Minimum height binary trees. Implementation of ordered binary trees. | | 4 |
| AVL trees. Characteristics. Implementation. | | 2 |
| B-Trees. Characteristics. Implementation. | | 2 |
| Introduction to graph data structure. Concepts. Types of graphs: undirected/directed and weighted graphs. | | 2 |
| Graph structure implementation using adjacency matrix | | 2 |
| Graph structure implementation using adjacency lists | | 2 |
| Graph transversal. Graphs Depth First traversal. Graphs Breadth First traversal | | 2 |
| Weighed graphs. Algorithms for determining minimum spanning tree in graphs. Prim Algorithm. Kruskal (priority search) algorithm. | | 2 |
| Algorithms for determining minimum path in graphs: Dijkstra algorithm. Floyd algorithm | | 2 |
| Transitive closure of a graph. Warshall algorithm. | | 2 |

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8. Creţu, Structuri de date şi algoritmi – vol. 1: Structuri de date fundamentale, Editura Orizonturi Universitare Timisoara, ISBN 973-9400-74-4, 2000


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Tree structure. Generalized trees. | Students receive practical homework at least a week in advance, and study it. At the beginning of the laboratory, possible implementation solutions for the proposed applications are discussed. Afterwards, the students start implementations (the proposed problems from each laboratory) under the guidance of the teacher. | 2 |
| Tree structure. Binary trees. | | 2 |
| Ordered binary trees. Node search techniques, traversal and ordered binary trees creation | | 4 |
| Ordered binary trees. Node suppression techniques | | 2 |
| AVL trees. Techniques for inserting and deleting nodes in AVL trees. | | 2 |
| B-trees. Techniques for inserting and deleting nodes in B-trees. | | 2 |
| Graph data structure. Implementing graphs through adjacency matrices. Graph transversal. | | 2 |
| Graph data structure. Implementing graphs through adjacency lists. Graph transversal | | 2 |
| Determining the minimum spanning tree of a weighted graph. Prim's algorithm | | 2 |
| Determining the minimum spanning tree of a weighted graph. Priority search (Kruskal) algorithm | | 2 |
| Techniques for determining the minimum paths in graphs. Dijkstra's algorithm and Floyd's algorithm | | 2 |
| Laboratory evaluations and final assessment | | 4 |

Bibliography


1. Zmaranda Doina, Bonaciu Marius, Coman Simina - Algoritmi si tehnici de programare, Lucrari practice de laborator, Revised edition, Editura Universitatii din Oradea, ISBN 978-606-10-1895-6, 2017
2. https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Frodica%5Fzmaranda%5Fdidactic%5Fuoradea%5Fro%2FDocuments%2FSDD%2FLAB%5FStructuri%5Fde%5Fdate


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computers specialization in other university centers that have accredited these specializations (Politehnica University of Timisoara, Bucharest Polytechnic University). Knowledge of the basic data structures presented in within this discipline together with specific algorithms and their application in the development of software represent a fundamental requirement in order to form the necessary programming skills and abilities that were requested by software companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: correct answers gathering 50 points in total are required (40 from questions + 10 points ex officio)<br>For 10: the correct answer to all the questions in the proposed topic is required (100 points) | **Written exam** - the assessment can be done face to face or online<br>Students receive for solving a quiz with several questions, each question tests the mastery of the theoretical concepts presented in the course. Each question has a score; in total, the questions total 90 points; 10 points are awarded ex officio. | 40 % |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: achieving a functional implementation in proportion of 50% of the applications proposed in the laboratory<br>For 10, detailed knowledge of how to implement all laboratory problems and 100% functional implementation is required | **Practical application** - evaluation can be done face to face or online.<br>At each laboratory, students are evaluated based on their activity (answers to questions, implementation proposals, etc.), evaluations that is finalized at the end of the laboratory by a mark for all activity during the semester. Also, in the last hours of the laboratory, the students were evaluated based on all practical implementation that were given to them during the semester. The average between the mark received from practical evaluation and the mark obtained from the laboratory activity will represent the final mark at the laboratory. | 60 % |

10.8 Minimum performance standard:

Course:

- knowledge and understanding of data structures used in programming and familiarity with their most representative applications: tree data structure and graph data structure
- familiarization with the main types of trees/graphs processing algorithms and the ways of using tree/graph data structures as well as the specific processing algorithms in solving given problems

Laboratory:

- knowledge in detail of the implementation of the tree data structure in all its variants: generalized trees, binary trees, AVL trees, B-trees and acquiring practical skills regarding their usage, together with specific processing algorithms, in the implementation of programs
- knowledge of the fundamental techniques for implementing the graph structure: implementation using adjacency matrices and implementation using adjacency structures

**Completion date:** 07.09.2022

**Date of endorsement in the department:** 21.09.2022

**Date of endorsement in the Faculty Board:** 23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | **Computers/ Bachelor Engineer** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Systems theory** | | | | | |
| 2.2 Holder of the subject | | Assoc..Prof. Eng.PhD. Gabor Gianina | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Assoc.Prof. Eng.PhD. Gabor Gianina | | | | | |
| 2.4 Year of study | 2nd | 2.5 Semester | 2nd | 2.6 Type of the evaluation | Continuous Assessment | 2.7 Subject regime | Domain Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 3 | of which: 3.2 course | 2 | 3.3 laboratory | 1 |
| 3.4 Total of hours from the curriculum | 42 | of which: 3.5 course | 28 | 3.6 laboratory | 14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 21 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 7 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 21 |
| Tutorials | 3 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **58** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | face to face or online<br>projector and access to Internet |
| 5.2.for the development of the academic seminary/laboratory/project | face to face or online<br>every student has access to a computer connected to Internet and with access to the applications/software used during the labs |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | **CP3**. Solving problems using computer science and engineering instruments |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Know and understand the fundamental systemic concepts and how to use them in control system theory as part of a general engineering training at a level that allows the students to approach practical and specific problems, individual study, creative and multidisciplinary technical usage. |
| 7.2 Specific objectives | ▪ to understand the fundamental concepts regarding systems and how to use and implement abstract block schemes to different systems<br>▪ to understand the methods used to determine the input-output mathematical models for linear systems<br>▪ to understand and use existing methods in order to obtain input-state-output mathematical models for linear systems<br>▪ to recognize the main system connections used in control system theory, solve/obtain the mathematical models for complex system connections<br>▪ to know how to work in operational domain and how to use the existing methods in order to solve different systems<br>▪ to know how to use block scheme algebra and fluency graphs<br>▪ to understand system stability concept and the methods used to solve linear systems stability<br>▪ to understand controllability and observability and the methods used to solve linear systems stability<br>▪ to understand the main control systems structures and the associated controllers |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Definitions and terminology - system, input and output, abstract models, subsystem, systems connection types, analogue and digital signals, mathematical models, identification | lecture /debate | 2 |
| Control system structures - block scheme, operating mode, control problem, fundamental structures used to control systems with and without feedback loop | lecture/debate | 2 |
| Mathematical models used for system modelling / input-output mathematical models for analogue and digital systems, input-state-output mathematical models for analogue and digital systems | lecture /debate | 2 |
| Main methods used to obtain mathematical models associated to physical systems | lecture /debate | 2 |
| Operating modes - operating point, static regime, dynamic regime, steady-state regime, transitional regime, free regime, forced regime, ordinary regime, random regime | lecture /debate | 2 |
| Methods used to calculate the matrix and transfer function for continuous | lecture /debate | 2 |

| | | |
|---|---|---|
| and discrete linear systems considering the time mathematical models | | |
| Transfer functions for linear systems in continuous times using fluency graphs and Mason's formula | lecture /debate | 2 |
| Mathematical models for continuous and discrete systems connections in time and block scheme algebra | lecture /debate | 2 |
| Linear systems concept and linearization method , main linear transfer elements, main non-linear transfer elements | lecture /debate | 2 |
| Response of linear systems in steady-state and transitional regime<br>State transformation/conversion and systemic achievements | lecture /debate | 2 |
| System stability concept, fundamental stability theorem and methods used to determine the stability of continuous and discrete systems | lecture /debate | 2 |
| Algebraic stability criteria/methods used for linear systems analysis - Hurwitz-Routh and Jury | lecture /debate | 2 |
| Controllability and observability of linear systems, Kalman and Hautus criteria | lecture /debate | 2 |
| Main control systems structures used in real systems and their associated controllers - P, PI. PD, PID | lecture /debate | 2 |
| Bibliography<br>Gianina GABOR, *Teoria sistemelor*, curs, format electronic, reactualizat 2018 & 2020<br>https://uoradea-my.sharepoint.com/personal/gianina_gabor_didactic_uoradea_ro/Documents/Forms/All.aspx#InplviewHash91928fea-9b64-429c-9b47-11ef26725031=RootFolder%3D%252Fpersonal%252Fgianina%255Fgabor%255Fdidactic%255Fuoradea%255Fro%252FDocuments%252FTS<br>Dragomir T.L. - *Elemente de teoria sistemelor*, colectia Automatica, Editura Politehnica Timişoara, 2004<br>Voicu M. - *Introducere în automatică (ed.II)*, Editura Polirom, Iaşi, 2002<br>Levine W.S. - *Control System Fundamentals*, CRC Press, 2000<br>Astrom K.J., Wittenmark B. - *Computer Controlled Systems*, Prentice Hall, 1997<br>Dorf R. – *Modern Control Systems*, Adison Reading, 1989 | | |
| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
| Fundamental concepts regarding systems and methods used to implement a block scheme for a real system | discuss examples and assign problems to solve | 2 |
| Methods used to implement mathematical input-output models for linear systems | discuss examples and assign problems to solve | 2 |
| Methods used to implement mathematical input-state-output models for linear systems | discuss examples and assign problems to solve | 2 |
| Main systems type connection - serial, parallel, feedback<br>Calculate/solve transfer functions for complex systems | discuss examples and assign problems to solve | 2 |
| Block scheme algebra methods used to solve systems transfer function<br>Transfer function of linear systems calculation using fluency graphs and Mason's formula | discuss examples and assign problems to solve | 2 |
| Algebraic stability methods used for linear systems analysis - Hurwitz-Routh and Jury criteria | discuss examples and assign problems to solve | 2 |
| Controllability and observability of linear systems - Kalman and Hautus criteria | discuss examples and assign problems to solve | 2 |
| Bibliography<br>Gianina GABOR, *Teoria sistemelor*, îndrumător de laborator, format electronic, reactualizat 2018 & 2020<br>https://uoradea-my.sharepoint.com/personal/gianina_gabor_didactic_uoradea_ro/Documents/Forms/All.aspx#InplviewHash91928fea-9b64-429c-9b47-11ef26725031=RootFolder%3D%252Fpersonal%252Fgianina%255Fgabor%255Fdidactic%255Fuoradea%255Fro%252FDocuments%252FTS<br>Dragomir T.L. - *Elemente de teoria sistemelor*, colectia Automatica, Editura Politehnica Timişoara, 2004<br>Dale S., Negrău M.- *Teoria sistemelor liniare-îndrumător de laborator*, Editura Universităţii din Oradea, 2002<br>Preitl St. – *Elemente de teoria sistemelor şi reglaj automat,* Editura Politehnica Timişoara, 1996 | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- through the information contained in the lecture and labs the students gain consistent knowledge matching with the required skills

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: in accordance with the maximum performance standard | face to face or online<br><br>written test /assignment | 60% |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10: in accordance with the maximum performance standard | face to face or online<br><br>oral test based on assignments | 40% |
| 10.8 Minimum performance standard:<br>Course: 5<br>Laboratory: 5 | | | |

**Completion date: 9.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board:23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | *Computers and Information Technology* |
| 1.4 Field of study | *Computers and Information Technology* |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | *Computers & Information Technology* / **Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | *Artificial Intelligence* | | | | | |
| 2.2 Holder of the subject | | Prof.dr.habil.eng. Daniela Elena Popescu | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **lect.dr.ing. Elisa Moisi** | | | | | |
| 2.4 Year of study **III** | | 2.5 Semester **6** | | 2.6 Type of the evaluation | **Cv** | 2.7 Subject regime | **DD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **14** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | **22** |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| 3.7 Total of hours for individual study | **70** |
| 3.9 Total of hours per semester | **112** |
| 3.10 Number of credits | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - The course can be held face to face or online "<br>- attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | - The seminar / laboratory / project can be held face to face or online<br>- Mandatory presence at all laboratories;<br>- Students must have completed the theoretical part of the paper;<br>- A maximum of 4 works can be recovered during the semester (30%); |

| | |
|---|---|
| | - The frequency at laboratory hours below 70% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | CP3. Problem solving using Computer Science and engineering tools<br><br>CP5. Design, life cycle management, integration and integrity of hardware, software and communications systems |
| Transversal skills | CT1. Applying, in the context of compliance with the law, intellectual property rights (including technology transfer), product certification methodology, principles, norms and values of the code of professional ethics within its own rigorous, efficient and responsible work strategy<br><br>CT2. Identify roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The discipline aims to familiarize students from specialization with issues related to the general issue of artificial intelligence, with special emphasis on search and optimization techniques |
| 7.2 Specific objectives | • The course aims to present the basic characteristics of the search techniques used in AI, the optimization techniques based on evolutionary calculation, respectively the general notions related to neural networks.<br>• Laboratory: Presentation of the Python language and its use in the implementation of specific search algorithms IA |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| • Introduction to AI. Definitions, Domains of AI. Agent definitions. Multi-agent systems. Intelligence of agents. Examples. Sub-fields of research<br>• Search strategies. Uninformed search. Informed search. Local search algorithms.<br>• Evolutionary computing. Genetic algorithms. Optimization with ant colonies. The constraint satisfaction problem, strategies in games.<br>• Machine Learning. Key concepts and data analysis. The main concepts of machine learning. Data Preprocessing (Data Analysis with Pandas, Data Visualization and Reporting Tools). Data manipulation and transformation techniques. (Techniques for handling missing values, Treatment of extreme values, Treatment of rare categories. Multiple techniques for treatment of categorical variables, Data processing and transformation techniques required for the main groups of machine learning algorithms)<br>• Supervised learning. Unsupervised learning - Clustering. Overfitting and comparative | • Free course presentation with video projector / overhead projector and blackboard in an interactive way: punctuate from time to time questions for students in order to increase the degree of interactivity<br>• Indication of topics for documentation and individual study | 28 hours |

| | | |
|---|---|---|
| validation. Classification and regression models (Linear regression. Logical regression. Binary classification. Multi-class classification). Hyperparameter optimization techniques using Scikit-learn. Model selection and validation. Kaggle competitions<br>• Neural networks. Deep Learning. Unidirectional networks ("feed-forward"), convolutional networks, recurrent networks | | |

Bibliography


- Notite de curs (slide-uri) puse la dispozitie studentilor in format electronic pe platforma Office 365
- T. M. Mitchell, Machine Learning,McGraw-Hill Science, 1997
- Machine Learning For Absolute Beginners by Oliver Theobald, 2016, https://www.pdfdrive.com/machine-learning-for-absolute-beginners-e188007429.html
- Vladu Ecaterina – Inteligenta artificiala, Editura universitatii din Oradea, ISBN 973-685-123-0
- S. Russell, P. Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall, 2002, http://aima.cs.berkeley.edu/, 2021
- D. Poole, A. Mackworth, R. Goebel. Computational Intelligence – a Logical Approach. Oxford University Press, 1998. http://www.cs.ubc.ca/~poole/ci.html
- AWS Academy (www.wasacademy.com) , AWS Academy Machine Learning Foundations [3790] – Educator, 2022
- https://www.kaggle.com
- https://scikit-learn.org/stable/
- Popescu Daniela Elena, Slide-uri curs incarcate pe platform Moodle


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Presentation of the laboratory, labor protection rules and basic Python libraries for ML<br>2. ML applications - regression - "Stock prices" with scikit-learn<br>3. ML applications - classification - "spam detection" with scikit-learn<br>4. ML applications - clustering - with scikit-learn<br>5. Use of Microsoft Azure automated learning<br>6. Use Microsoft Azure Designer<br>7. Connect to the Kaggle platform - view ongoing competitions and register as a competitor | Students receive laboratory papers at least one week in advance, study them, inspect them, and take a theoretical test at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher. | 2 hours are allocated for each of the 14 detailed points of the laboratory activity. |

Bibliography


1. Platforma Office 365 cu lucrarile de laborator
2. https://www.kaggle.com
3. https://scikit-learn.org/stable/


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer and Information Technology specializations and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc. ), and knowledge of the architecture and organization of computer systems as well as their operation and design is a stringent requirement of employers in the field (Rds & Rcs, Plexus, Neologic, Celestica, Keysys, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5) in accordance with the minimum performance standard:<br>- it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br><br>For 10:<br>- for grade 10, a thorough knowledge of all is required | The evaluation can be done face to face or online depending on the situation imposed | 60% |
| 10.6 Laboratory | - for grade 5, broadly knowing the problems of artificial intelligence<br>Specifically: For grade 5: correct answer to at least 1 question out of 3 for each paper.<br>- for grade 10, detailed knowledge of search algorithms, optimization and problems related to evolutionary computation, respectively neural networks<br>Specifically: For grade 10: correct answer to all questions. | **Test + practical application**<br><br>At each laboratory students receive a test and a grade.<br><br>Also, each student receives a note for the activity at the laboratory during the semester and for the file with the laboratory works. This results in an average for the laboratory.<br><br>The questions are asked based on the reports prepared in the laboratory works. | 40% |
| 10.8 Minimum performance standard:<br>Assimilation of detailed knowledge about the construction, operation and design of central processing units for digital computers, as well as about the organization of different types of memories associated with them.<br>The studied design methods are exemplified on existing architectures, including the study of special architectures.<br>The term solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level.<br>Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, own research related to learning (library, internet), cultivating a discipline of work, done correctly and on time | | | |

**Completion date:**
08.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**

**DISCIPLINE SHEET**

**1. Facts about the program**

| | |
|---|---|
| 1.1 Instituţia de învăţământ superior | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY** |
| 1.3 Department | **COMPUTERS AND INFORMATION TECHNOLOGY** |
| 1.4 Field of study | **COMPUTERS** |
| 1.5 Cycle of studies | **LICENŢĂ** |
| 1.6 Study program/qualification | **COMPUTERS /ENGINEER** |

**2. Discipline data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the discipline | **COMPUTER-AIDED GRAPHICS** | | | | | | |
| 2.2 The holder of the course activities | - | | | | | | |
| 2.3 Holder of laboratory/project activities | **Lecturer.dr.ing. Sebeşan Radu** | | | | | | |
| 2.4 Year of study | **I** | 2.5 Semester | **1** | 2.6 Type of assessment | **VP** | 2.7 Discipline regime | **DF** |

**3. Estimated total time** (hours per semester of teaching activities)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Număr de ore pe s ă pt ă ă r o ă ăă | **1** | of which: 3.2 course | **-** | 3.3 Laboratory | **1** |
| 3.4 Total hours ofthe learning plan | **14** | of which: 3.5 course | **-** | 3.6 laboratory | **14** |
| Distribution ofthetime fund for hours | | | | | **Hours** |
| Study by textbook, course support, bibliography and notes | | | | | 3 |
| Additional documentation inthe library, on specialized electronic platforms andin the field | | | | | 3 |
| Preparation of seminars/laboratories, themes, papers, portfolios and essays | | | | | 3 |
| Tutoriat | | | | | |
| Examinecountries | | | | | 2 |
| Other activitiesi..... | | | | | |

| | |
|---|---|
| 3.7 Total individual study hours | **11** |
| 3.9 Total hours per semester | **25** |
| 3.10 Numberof credits | **1** |

**4. Preconditions** (where applicable)

| | |
|---|---|
| 4.1 curriculum | - Knowledgeof descriptive geometry |
| 4.2 of competitionţe | |

**5.Conditions** (where applicable)

| | |
|---|---|
| 5.1. course development | - |
| 5.2. of laboratory /project development | - Equipment related to the development of laboratory hours - computers, AutoCAD software<br>they can be carried out face to face or online. |

| **6. Specific competences acquired** | |
|---|---|
| Professional skills | **C6 Carrying out the activities of operation, maintenance, service, system integration**<br><br>**C6.1.** Definition of basic concepts regarding the operation and maintenance of electromechanical systems<br>**C6.2**<br>Identification and selection of components for operation, maintenance and integration in electromechanical systems<br>**C6.4** Use of methods and technical means to increase the reliability of electromechanical systems |

| | |
|---|---|
| Competențe transverse | **CT1.** Identification of the objectives to be achieved, of the available resources, the conditions for their completion, the working stages, the working times, the related deadlines for achievement and the related risks.<br>**CT3.** Efficient use of information sources and resources for communication and assisted professional training (portals, Internet, specialized software applications, databases, online courses) both in Romanian and in an international language. |

**7. Objectives of the discipline** (based on the grid of specific competences accumulated)

| | |
|---|---|
| 7.1 The general objective of the discipline | The laboratory of "Computer-assisted graphics " is the discipline of general technical culture, mandatory in the training of future engineers. It aims to acquire the fundamental knowledge of engineering graphics, universal communication language in technique. |
| 7.2 Specific objectives | ▪ The laboratory aims to acquire the basic knowledge in the field of orthogonal graphic representation, to obtain the true size, some geometrical elements as well as the developments that define the technical pieces. Learn the rules of representation, quotation and scoring of technical drawings, according to the rules generalized worldwide by ISO, with the help of the computer using the AutoCAD program.<br>▪ The laboratory familiarizes students with practical aspects regarding the realization of technical drawings, with the help of the computer using the AutoCAD program. |

**8. Conţinuturi**

| 8.1.Curs | Teaching methods | No. Hours / Remarks |
|---|---|---|
| **8.2. Laboratory** | **Teaching methods** | **Observaţii** |
| 1. Presentation of the laboratory, of the labor protection norms and of the laboratory works. | For laboratory applications, students will have at their disposal written materials presenting the way of carrying out the practical work. The applications contain written, concrete instructions, as well as general information about the new orders encountered. In order to carry out the practical applications, the students will use the computer network and the AutoCAD program, which is equipped with the technical drawing laboratory | 2 hours |
| 2.Execution of drawings with the help of absolute, relative, polar coordinates and commands LINE, GRID, SNAP, ERASE. Realization of sandardized A3 drawing format and indicator. | | 2 hours |
| 3. Double representations and orthogonal projection of the point . Representations in double orthogonal projection of the right. . Making drawings using editing commands with specifying attachment points. | | 2 hours |
| 4. Representation in view using the rules of representation and scoring of views. . Representation of drawings in section respecting the indicated sectioning paths Configuration of the elements of the quotation. The hatching of the drawings. | | 2 hours |
| 5. Applications with the practice of the main editing commands: Breack, Offset, Extens, Fillet, Chamfer, Array. Combining drawing and editing commands to obtain the desired model. Listing drawingsin interactive graphics and using non-graphic elements such as texts, tables, symbols. Making a three-dimensional 3D drawing. | | 2 hours |
| 6. Recovery oflaboratory work. | | 2 hours |
| 7. Evaluation of dob knowledgeâ ndâ â | | 2 hours |
| Bibliography<br>1. Durgău M., Sebeşan R., *Computer-assisted graphics / laboratory works***,** , 2012,<br>2. M.Durgău, R.Sebeşan – *Computer-assisted graphics – Electrical diagrams*, 2012<br>3. M.Durgău – *Laboratory works - Technical drawing assisted by calcul*or, 2014<br>4. Sebeşan R., *Computer-assisted graphics / laboratory work***,** 2022, electronic format on the e.uoradea.ro platform | | |
| 8.3. Project | Teaching methods | Observaţii |

| Bibliography |
|---|

**9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program**

- The content of the discipline can be found in the curricula of specializations in the technical field and in other university centers that have accredited these specializations, and knowledge of the rules of design and drawing is a stringent requirement of employers in the technical field.

**10. Evaluation**

| Activity Type | 10.1 Assessment criteria | 10.2 Assessment methods | 10.3 Share of final grade |
|---|---|---|---|
| 10.4 Laboratory | - for note 5 it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>- for grade 10, it is necessary to have a thorough knowledge of all subjects | **Verification** can be carried out face to face or online.<br>The discipline ends at the end of the first **semester**.<br>Minimum promotion mark = 5, with both components = 5 (laboratory)<br>**Examination mode:** Partial evaluations based on tests/homework.<br>Overall assessment; Applications – practical (duration 1 hour). Theory / writing (duration 1 hour)<br>**Topic structure:** Quiz with questions from the course topic. | 50 % |
| 10.5 Laboratory | - for note 5, the recognition of the stands used for carrying out the laboratory works, without presenting details on them<br>- for note 10, detailed knowledge of the way of practical realization of all laboratory works | **Test + practical application** can be carried out face to face or online.<br>Making an execution drawing in AutoCAD<br>Each student receives a grade for the work at the laboratory during the semester and for the file with the laboratory papers. This results in an average for the laboratory. | 50 % |
| 10.7 Minimum performance standard | | | |
| **Laboratory :**<br>- The ability to collaborate with specialists from various fields in the development of complex projects;<br>- The formation and development of the spatial thinking capacity in the modeling of industrial forms and graphic skills necessary for the correct realization of a drawing;<br>- Acquiring basic knowledge for the use of specific design programs – AutoCAD with other utility programs related to: databases, resistance calculation, industrial design, bi- and three-dimensional representations,<br>- Acquiring knowledge of computer-aided engineering graphics;<br>- Participation in at least half of the courses.<br>- The ability to make a technical drawing according to technical standards, with the help of autocad program.<br>- Participation in all laboratory work. | | | |

Signature of the course holder

--

Signature of the laboratory holder

S.l dr.ing. Radu Sebeşan

e-mail: rsebesan@uoradea.ro

**Date of completion:**

29.08.2022

**Date of approval in the department:**

01.09.2022

Signature of the Department Director

Prof.univ.dr.ing.inf.habil. Francis – John Hathazi

e-mail: ihathazi@uoradea.ro

**Date of approval in the department:**

22.09.2022

Signature of the Director of Department

Conf.univ.dr.ing. Mirela Pater

e-mail: mpater@uoradea.ro

**Date of approval in the Faculty Council:**

23.09.2022

Signature of Dean

Prof.univ.dr.ing. habil. Ioan – Mircea Gordan,
email: mgordan@uoradea.ro

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Information Technology / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **NUMERICAL METHODS** | | | |
| 2.2 Holder of the subject | | | | **Ș.l.dr.inf. Bolojan Octavia-Maria** | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | **Ș.l.dr.inf. Bolojan Octavia-Maria** | | | |
| 2.4 Year of study | II | 2.5 Semester | III | 2.6 Type of the evaluation | Vp | 2.7 Subject regime | FD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 14 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |
| Distribution of time | | | | | 56 hours |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 12 |
| Tutorials | | | | | 2 |
| Examinations | | | | | 6 |
| Other activities. | | | | | |
| **3.7 Total of hours for individual study** | **56** | | | | |
| **3.9 Total of hours per semester** | **112** | | | | |
| **3.10 Number of credits** | **4** | | | | |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Students must have fundamental knowledge from the following disciplines: Linear algebra, Mathematical analysis, Differential equations, Computer programming and programming languages I |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer, blackboard, flipcharts, chalk, markers. The course can be held face to face or online. |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that are connected to the Internet and dedicated software installed (Matlab). The laboratory can be held face to face or online. |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | • **CP3.** Solving problems using computer science and engineering instruments<br>• **CP4.** Design and integration of information systems using technologies and programming environments |
| Transversal skills | • **CT1:** Responsible execution of professional tasks, respecting the values and ethics of the engineering profession, in conditions of limited autonomy and qualified assistance, based on documentation, convergent and divergent logical reasoning, practical applicability, evaluation, self-evaluation and optimal decision: responsible executor for professional tasks;<br>• **CT2:** Identifying, describing and carrying out the processes in project management, taking over the different roles in the team and clearly and concisely describing, verbally and in writing, the results in the field of activity;<br>• **CT3:** Objective self-assessment of the need for professional development and openness to lifelong learning, as well as the efficient use of language skills, knowledge of information technology and communication for personal and professional development: aware of the need for lifelong learning. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Identify classes of problems and methods of solving characteristic of computer systems.<br>▪ Using interdisciplinary knowledge, solution patterns and tools, conducting experiments and interpreting their results. |
| 7.2 Specific objectives | ▪ Effective implementation of an application using computer science tools.<br>▪ Development and implementation of IT solutions for concrete problems.<br>▪ Comparative evaluation, including experimental, of solving alternatives, to optimize performance.<br>▪ Application of solution patterns using engineering tools and methods. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introduction to Matlab programming<br>1.1. Introduction<br>1.2. Instructions and commands in Matlab. Matlab functions | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 1.3. Matlab graphics<br>1.3.1. Functions for two-dimensional graphical representations<br>1.3.2. Functions for three-dimensional graphical representations | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 2. Errors and Floating Point Arithmetic. Introductory notions<br>2.1. Absolute error. Relative error.<br>2.2. Exact significant digits | Lecture and Scientific Workplace pdf slides presentation with the help of the | 2 |

| | | |
|---|---|---|
| 2.3. Error sources | video projector; free discussions. | |
| 3. Numerical Methods for solving linear algebraic systems<br>3.1. Direct methods<br>3.1.1. Gaussian Elimination<br>3.1.2. LU (Lower-Upper) Factorization | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 3.2. Indirect methods<br>3.2.1. Jacobi Method. Gauss-Seidel Method<br>3.2.2. SOR (Successive Over-Relaxation) | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 4. Function Approximation<br>4.1. Function interpolation<br>4.1.1. Lagrange Interpolation<br>4.1.2. Spline Interpolation<br>4.1.3. Matlab functions for interpolation | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 4 |
| 4.2. The least square approximation<br>4.2.1. Linear regression<br>4.2.2. Polynomial regression<br>4.2.3. Matlab functions for regression | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 5. Solving nonlinear equations<br>5.1. Successive approximation method<br>5.2. Bisect method<br>5.3. Tangent method<br>5.4. Secant method | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 5.5. Newton-Raphson method for solving nonlinear systems of equations | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 6. Numerical Differentiation and Numerical Integration<br>6.1 Finite differences. Numerical differentiation of functions | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 6.2. Trapezoidal numerical integration. Quadrature methods<br>6.3. Simpson's formulas. Quadrature formulas | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 6.4. Newton-Cotes quadrature formulas. Numerical integration commands using Matlab | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| 6.5 Gauss quadrature formula. | Lecture and Scientific Workplace pdf slides presentation with the help of the video projector; free discussions. | 2 |
| | | |

**Bibliography**


1. O. Agratini, I. Chiorean, Gh. Coman, R. Trîmbiţaş, *Analiză numerică şi teoria aproximării*, vol. III, Editura Presa Universitară Clujeană, 2002.
2. O.-M. Bolojan, M.-A. Șerban, *Metode numerice. Exerciții și probleme rezolvate în Matlab*, Editura Casa Cărţii de Ştiinţă, Cluj-Napoca, 2016, ISBN 978-606-17-1070-6 (format electronic).
3. O.-M. Bolojan, *Metode numerice* (notițe de curs, prezentări Beamer-Scientific Workplace).
4. T. Cătinaş, Gh. Coman, I. Chiorean, *Numerical Analysis. Advanced Course*, Editura Presa Universitară

Clujeană, Cluj-Napoca, 2007.
5. T. Cătinaş, I. Chiorean, R. Trîmbiţaş, *Analiză numerică*, Editura Presa Universitară Clujeană, Cluj-Napoca, 2010.
6. R. Despa, C. Coculescu, *Metode Numerice*, Editura Universitară, Bucureşti, 2006.
7. C. V. Muraru, *Metode Numerice: Seminarii Matlab*, Editura EduSoft, Bacău, 2005.
8. S. Nakamura, *Numerical Analysis and Graphic Visualization with Matlab*, The Ohio State University, Columbus, Ohio, 1996.
9. S.S. Rao, Applied *Numerical Methods for Engineers and Scientists*, Pretince Hall, University of Miami, Florida, 2002.
10. C. Vancea, F. Vancea, *Metode Numerice prezentate în Matlab*, Editura Universităţii Oradea, 2001.
11. C. Vancea, *Metode Numerice în Electrotehnică*, Editura Universitţii Oradea, 2005.
12. E. Zauderer, *Partial Differential Equation of Applied Mathematics*, Wiley Interscince Publication, 1989.

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introduction to Matab. Using the Matlab programming environment | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab programming environment | 4 |
| 2. Using the Matlab graphics environment | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab programming/graphics environment | 4 |
| 3. Programs and software applications for solving direct linear algebraic systems. Using Matlab and C ++ languages | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab and C++ programming environments | 2 |
| 4. Programs and software applications for solving iterative linear algebraic systems. Using Matlab and C ++ languages. | Lecture/Oral presentation. Testing and discussing practical examples and problems from | 2 |

| | | |
|---|---|---|
| | courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab and C++ programming environments | |
| 5. Programs for polynomial interpolation. Lagrange interpolation. Using the Matlab programming environment. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 6. Spline interpolations. Using the Matlab programming environment. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 7. Programs for linear regression and polynomial regression. Using the Matlab programming environment. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 8. Programs for solving nonlinear equations. Bisection method. Using the Matlab programming environment. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 9. Newton's method for nonlinear equations. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 10. Numerical differentiation problems in Matlab. | Lecture/Oral presentation. | 2 |

| | | |
|---|---|---|
| | Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | |
| 11. Numerical integration. The trapezoidal quadrature formula. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab | 2 |
| 12. Implementation of Simpson's numerical integration formulas. | Lecture/Oral presentation. Testing and discussing practical examples and problems from courses/laboratory tutorials. Solving and implementing programs and applications/practical examples in Matlab. | 2 |
| | | |

Bibliography


1. U. M. Ascher, L. R. Petzold, *Computer Methods for Ordinary Differential Equations and Differential-Algebraic Equations*, SIAM, Philadelphia PA,1998.
2. O.-M. Bolojan, M.-A. Șerban, *Metode numerice. Exerciții și probleme rezolvate în Matlab*, Editura Casa Cărţii de Ştiinţă, Cluj-Napoca, 2016, ISBN 978-606-17-1070-6 (format electronic).
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13. E. Süli, D.F. Mayers, *An Introduction to Numerical Analysis*, Cambridge University Press, Cambridge, 2003
14. R.T. Trîmbițaș, *Analiză numerică. O introducere bazată pe Matlab*, Editura Presa Universitară Clujeană, 2005.
15. C. Vancea, *Metode Numerice- Îndrumător de laborator*, Editura Universităţii Oradea, 1995.


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The aim of the course is to form a basic tool, at the disposal of the future engineer, of numerical analysis, for scientific and engineering problems, with the presentation of

numerical methods using programming languages.

- The content of the discipline is consistent and contributes to the acquisition and development of the principles/skills needed in creating and implemeting programs/software applications based on algorithmical thinking.
- The modeling of physical phenomena is increasingly encountered in many scientific and engineering fields and has developed rapidly through complex and multiple numerical methods that allow solutions and simulations with high-performance computing technology, which represents a real progress both in the technical field and in life. daily. The course exists in the curriculum from Romanian/abroad universities.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | 1.Analysis and estimation of errors in numerical approximation.<br>2.Application of numerical approximation methods learned on concrete numerical examples.<br>3. Choosing the best numerical method in solving a specific problem.<br><br>Minimum required conditions for passing the exam (mark 5): each subject is solved/treated in accordance with the minimum performance standards.<br><br>For 10: Correct and complete answers to all subjects/questions/problems/ topics/requirements. | Written paper/exam (2 stages)<br><br>Students receive for solving topics/subjects/problems that cover the theoretical and applied part of the discipline.<br><br>(week 7/8 and week 13/14, respectively)<br><br>The evaluation can be done face to face or online. | VP1: 30%<br>VP2: 30% |
| 10.5 Academic seminar | | | |
| 10.6 Laboratory | 1. Using the Matlab programming environment.<br>2. Programming skills in Matlab.<br>3. 2D and 3D graphical representations of the obtained results and their interpretation.<br>4. Advantages and disadvantages of programming in Matlab.<br><br>Minimum required conditions for promotion (grade 5 each subject is solved/treated in | Practical laboratory work/exam<br><br>Students receive for solving topics similar to the applications that were implemented in the laboratory work/classes during the semester. Students receive questions based on the implemented applications.<br><br>The activity during the | 40% |

| | | | |
|---|---|---|---|
| | accordance with the minimum performance standards.<br><br>For 10: Correct and complete answers to all subjects/questions/problems/ topics/requirements related to programming skills in Matlab. | semester, the fulfillment of the work tasks during the laboratory hours will also be taken into account.<br><br>(week 13/14)<br><br>The evaluation can be done face to face or online. | |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br><br>Course: Grade for written exam/paper: minimum 5.00.<br>Laboratory: Completing all laboratory work/classes, mark for practical exam: minimum 5.00.<br>The calculation of the final grade is done by rounding the final score to the full grade. | | | |

**Completion date:**
**08.09.2022**

Course/Laboratory holder:
Ș.l. dr. inf. Bolojan Octavia-Maria
obolojan@uoradea.ro

**Date of endorsement in the department:**
**21.09.2022**

Head of the Department:
Conf.univ.dr.ing.Mirela PATER
mpater@uoradea.ro

**Date of endorsement in the Faculty Board:**
**23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **ELECTROTECHNICS I** | | | | |
| 2.2 Holder of the subject | | | **MOLNAR CARMEN OTILIA** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **MOLNAR CARMEN OTILIA** | | | | |
| 2.4 Year of study | **I** | 2.5 Semester | **2** | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **DD - Domain Discipline** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **3** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory | **-/1** |
| 3.4 Total of hours from the curriculum | **42** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory | **-/14** |
| Distribution of time | | | | | **58** |
| Study using the manual, course support, bibliography and handwritten notes | | | | | **14** |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | **14** |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | **14** |
| Tutorials | | | | | **8** |
| Examinations | | | | | **8** |
| Other activities. | | | | | **-** |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **58** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) - |
| 4.2 related to skills | - |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted online or face to face, in the amphitheater with modern techniques available: Video projector, Blackboard, Free speech |
| 5.2.for the development of the academic seminary/ /laboratory/project | The laboratory can be held face to face or online<br>The practical applications are made using the modern working means existing in the Electrical Engineering laboratory (DEGEM workstations, high-performance and current measuring devices, modeling software, etc.).<br>Students come with the observed laboratory work<br>Mandatory presence at all laboratories<br>It is possible to recover during the semester 30% of the laboratory works; |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | C1. Use of knowledge of mathematics, physics, measurement technology, technical graphics, mechanical, chemical, electrical and electronic engineering in systems engineering.<br>C1.1 Use in professional communication of the concepts, theories and methods of fundamental sciences used in systems engineering.<br>C1.2 Explain the problems to be solved and argue the solutions in systems engineering, by using techniques, concepts and principles from mathematics, physics, technical graphics, electrical engineering, electronics. |

| | |
|---|---|
| Transversal skills | CT2. Identifying roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The course "Electrotechnics I" ensures the basic theoretical and practical technical training of students, presents elements of the theory of electrical circuits in terms of applications in technology addressing students in the first year of study. Being a fundamental domain discipline, its objective is the presentation in a unitary framework of some calculation methods of general interest, necessary to solve the different problems specific to the classical or modern electrical engineering.<br>▪ The discipline tries to form the following attitudinal competencies: manifestation of a positive and responsible attitude towards the scientific field / optimal and creative capitalization of one's own potential in scientific activities / involvement in promoting scientific innovations / engaging in partnerships with others / participation in own development professional |
| 7.2 Specific objectives | ▪ The course "Electrotechnics I" presents elements of the theory of electrical circuits: the regime approaches for the electrical circuits (linear electrical circuits in stationary regime, nonlinear direct current, in permanent sinusoidal regime) as well as the specific methods of analysis of electrical circuits presented.<br>▪ The course begins with the presentation of the constituent elements of electrical circuits and the problems related to the automatic formulation of the equations of electrical circuits. The characterization of the periodic sinusoidal regime and the presentation of the complex analysis method are presented.<br>▪ The objectives of the discipline are to know and understand the basic relationships of electrical circuits in nonlinear steady state direct current, in permanent sinusoidal mode, explaining and interpreting the behavior of electrical circuits, performing calculations and determinations in electrical circuits, experimental verification of basic relationships for physical systems encountered in industrial practice, simulating the operation of electrical circuits with specialized software.<br>▪ The laboratory activity is focused on applications specific to the chapters taught in the course and aims at the experimental verification of the basic relations for the encountered physical systems. The performance of laboratory works offers, in addition to the formation of skills in the electrical field, the use of physical and numerical modeling, sizing of assemblies, the correct use of measuring equipment, evaluation of errors in experimental determinations performed. |

**8. Contents**

| **8.1 Course** | Teaching methods | No. of hours |
|---|---|---|
| **CHAPTER 1. STATIONARY LINEAR ELECTRICAL CIRCUITS**<br>Generalities. References. DC circuit elements.<br>Diagrams and graphs of electrical circuits. | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Voltage-current characteristics of linear circuit elements<br>Kirchhoff's theorems. Independent equations<br>Transfiguration theorems.<br>Transfiguration of series connected network sides | Video projector, slides and whiteboard. Interactive teaching. The course can be conducted online or face to face | 2 |
| Transfiguration of network sides connected in parallel.<br>Transfiguration of a voltage generator into a current generator. | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Methods for calculating linear electrical circuits.<br>Kirchhoff's theorem method. Algorithm<br>Cyclic or contour current theorem. Algorithm | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Node potential theorem. Algorithm<br>Superposition theorem. Algorithm | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Power conservation theorem.<br>Regime specific applications | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| **CHAPTER 2. NON-LINE DC ELECTRICAL CIRCUITS**<br>Nonlinear element. Characteristics | Video projector, slides and whiteboard. Interactive teaching. The course can be conducted online or face to face | 2 |

| | | |
|---|---|---|
| Kirchhoff's theorems and small variations.<br>Methods for solving nonlinear networks. Graphic methods. | | |
| Non-linear circuits connected in series.<br>Nonlinear circuits connected in parallel.<br>The characteristic of an active network side.<br>Nonlinear element connected in series with a linear element | Video projector, slides and whiteboard. Interactive teaching. The course can be conducted online or face to face | 2 |
| **CHAPTER 3. PERMANENTLY SINUSOIDAL ELECTRICAL CIRCUITS**<br>Generalities. Circuit elements. Resistor, Coil, Coupled Coils, Capacitor. Voltage sources, current sources | Video projector, slides and whiteboard. Interactive teaching. The course can be conducted online or face to face | 2 |
| Kirchhoff's theorems and Joubert's theorem in instantaneous values. Alternative sinusoidal sizes Representation of alternative sinusoidal quantities | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Analytical representation (in complex) of alternative sinusoidal quantities. RLC series circuit. Facial diagrams. RLC parallel circuit. Facial diagrams | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| Complex impedance and admittance<br>Joubert's theorem and Kirchhoff's theorems in complex form | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |
| The analogy between direct current and sinusoidal alternating current. Specific applications of the a.c. using Kirchhoff's theorems for stinging without magnetic couplings | Video projector, slides and whiteboard. Interactive teaching. The course can be conducted online or face to face | 2 |
| Electric power in single-phase alternating current circuits Specific applications of the a.c. using Kirchhoff's theorems for circuits without magnetic couplings | Video projector, slides and whiteboard. Interactive teaching . The course can be conducted online or face to face | 2 |

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3. Leuca T. - Circuite electrice si aplicaţii, Editura Mediamira Cluj-Napoca, 1996
4. Leuca, T. – Elemente de teoria câmpului electromagnetic. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002.
5. Leuca T., **Carmen Molnar** - Circuite electrice. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002, pag. 440, ISBN 973-613-072-X.
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7. Leuca T., **Carmen Otilia Molnar**, Arion M. N. – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014, pag. 472, ISBN 978-606-10-1284-8
8. Leuca, T., Maghiar, T. - Electrotehnică, Probleme, vol. IV, Litografia Universităţii din Oradea, 1994.
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13. Mocanu, C. I. - Teoria circuitelor electrice, Ed. Didactică şi Pedagogică, Bucureşti, 1979.
14. **Carmen O. Molnar** - Teoria câmpului electromagnetic, Editura Universităţii din Oradea, 2005, pag.223, ISBN 973-613-833-X
15. **Carmen Molnar**, Arion M. - Electrotehnică. Aplicaţii practice, Editura Universităţii din Oradea, 2003, pag. 113, ISBN 973-613-274-9.
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18. Preda, M., Cristea, P. - Analiza şi sinteza circuitelor electrice, Ed. Tehnică Bucureşti, 1968
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21. Simion, E., Maghiar, T. - Electrotehnică, Ed. Didactică şi Pedagogică, Bucureşti, 1981
22. Şora, C.- Bazele electrotehnicii, Ed. Didactică şi Pedagogică, Bucureşti, 1982

| **8.2 Seminary** | Teaching methods | No. of hours |
|---|---|---|
| **8.2 Laboratory** | Teaching methods | No. of hours |
| Lab presentation. Theoretical notions of health and safety protection during practical activities from the laboratory | Aspects regarding the norms of health and safety protection during work in the electrical engineering laboratory are presented and discussed. The circuit elements, the measuring devices are presented | 2 |
| Circuit elements, apparatus for measuring voltages and currents. Measurement of currents, voltages and resistances. Electric potentiometer | With the help of DEGEM modules and measuring devices, the work with the same title is completed. The laboratory can be conducted online or face to face | 2 |
| Ohm's law. Experimental verification. | | 2 |
| Series resistors. Parallel resistors. Power developed in a resistor | | 2 |
| Study of series-parallel circuits. Theoretical and experimental verification | | 2 |
| Experimental verification of Kirchhoff's first theorem. Experimental verification of Kirchhoff's second theorem | | 2 |
| Verification of knowledge | Verification test. The laboratory can be conducted online or face to face | 2 |

**Bibliography**


1. Leuca, T., Molnar Carmen - Circuite electrice. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002.
2. Leuca, T. - Bazele electrotehnicii - îndrumător de laborator, litografiat Univ. din Oradea, 1991
3. Leuca T., **Carmen Otilia Molnar**, Arion M. N. – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014
4. **Molnar Carmen**, Arion M. – Electrotehnică. Aplicaţii practice – Editura Universităţii din Oradea, 2003.
5. Maghiar, T., Leuca, T., Silaghi, M., Marcu, D. - Circuite electrice liniare în regim permanent sinusoidal - îndrumător de laborator, litografiat Universitatea din Oradea, 1997.
6. Maghiar, T., Leuca, T., Silaghi, M., Coroiu Laura, Grava Adriana, Grava C.- Circuite electrice liniare de curent continuu - îndrumător de laborator, Editura Universităţii din Oradea, 2009
7. Soproni V.D., Maghiar T, Silaghi M., Pantea M. – Electrotehnică si masini electrice, Îndrumător de laborator, Editura Universităţii din Oradea, 2003
8. Pantea M., Silaghi M. – Teoria câmpului electromagnetic, Îndrumător de laborator, Editura Universităţii din Oradea, 2011


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the subject is in accordance with the one in other national or international universities. In order to provide a better accomodation to the labour market requirements, there have been organized meetings both with representatives of the socio-economic environment and with academic staff with similar professional interest fields.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | - | Written and oral exam in the exam room or online with internet connection. | 70 % |
| 10.5 Seminary | - | - | - |
| 10.6 Laboratory | - | Knowledge assessment test<br>- All laboratory work must be performed in the electrical and / or on-line laboratory with internet connection;<br>- Only the recovery of an outstanding laboratory is allowed (in the last week of the semester) | 30 % |

10.8 Minimum performance standard:

- Understanding how to solve electrical circuit problems encountered in practical applications.
- Direct determination of electrical quantities using measuring devices.
- Solving the problems of linear electrical circuits in stationary regime, the problems of electrical circuits in permanent sinusoidal regime and the problems of electrical circuits using professional programs of numerical analysis.

**Completion date:**
29.08.2022

Semnătura titularului de curs

**Conf.dr.ing. Carmen Molnar**
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Semnătura titularului de laborator

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**Date of endorsement in the department:**

Department of Electrical Engineering

1.09.2022

Semnătura directorului de departament
**Sprof.univ.dr.ing.inf. Francisc - Ioan HATHAZI**

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Semnătură Decan
**Prof.univ.dr.ing. Mircea Ioan GORDAN**
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**The beneficiary academic entity of the Discipline Sheet**

Department of Computers and Information Technology

Semnătura directorului de departament
**Conf.univ.dr.ing. Mirela PATER**
E-mail: mpater@uoradea.ro

**Date of endorsement in the Faculty Board:**

23.09.2022

Semnătură Decan
**Prof.univ.dr.ing. Mircea Ioan GORDAN**
E-mail: mgordan@uoradea.ro

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program / Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | **ELECTROTECHNICS II** | | | | | | |
| 2.2 Holder of the subject | **MOLNAR CARMEN OTILIA** | | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | **MOLNAR CARMEN OTILIA** | | | | | | |
| 2.4 Year of study | **II** | 2.5 Semester | **3** | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **DD - Domain Discipline** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **3** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory | **- / 1** |
| 3.4 Total of hours from the curriculum | **42** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory | **- / 14** |
| Distribution of time | | | | | **33** |
| Study using the manual, course support, bibliography and handwritten notes | | | | | **10** |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | **7** |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | **7** |
| Tutorials | | | | | **3** |
| Examinations | | | | | **6** |
| Other activities. | | | | | **-** |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **33** |
| **3.9 Total of hours per semester** | **75** |
| **3.10 Number of credits** | **3** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Electrotechnics I |
| 4.2 related to skills | - |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted online or face to face, in the amphitheater with modern techniques available: Video projector, Blackboard, Free speech |
| 5.2.for the development of the academic seminary/laboratory/project | The laboratory can be held face to face or online<br>The practical applications are made using the modern working means existing in the Electrical Engineering laboratory (DEGEM workstations, high-performance and current measuring devices, modeling software, etc.).<br>Students come with the observed laboratory work<br>Mandatory presence at all laboratories<br>It is possible to recover during the semester 30% of the laboratory works; |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | C1. Use of knowledge of mathematics, physics, measurement technology, technical graphics, mechanical, chemical, electrical and electronic engineering in systems engineering.<br>C1.1 Use in professional communication of the concepts, theories and methods of fundamental sciences used in systems engineering.<br>C1.2 Explain the problems to be solved and argue the solutions in systems engineering, by using techniques, concepts and principles from mathematics, physics, technical graphics, electrical engineering, electronics. |

| | |
|---|---|
| Transversal skills | CT2. Identifying roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The course "Electrotechnics II" ensures the basic theoretical and practical technical training of students, presents electromagnetic phenomena in terms of applications in technology. It is a fundamental domain discipline that presents calculation methods of general interest, necessary to solve various problems specific to classical or modern electrical engineering.<br>▪ The discipline tries to form the following attitudinal competencies: manifestation of a positive and responsible attitude towards the scientific field / optimal and creative capitalization of one's own potential in scientific activities / involvement in promoting scientific innovations / engaging in partnerships with others / participation in own development professional |
| 7.2 Specific objectives | ▪ The course "Electrotechnics II" further presents elements of the theory of electrical circuits: the regime approach of electrical circuits (three-phase electrical circuits, linear electrical circuits in periodic non-sinusoidal mode, linear electrical circuits in transient mode) and specific methods of analysis of electrical circuits presented. The course continues with the presentation of the basic elements (quantities, units, general and material laws) of the macroscopic theory of electromagnetism, for understanding the technical applications of this theory. The study of the fundamental relations and electrostatic phenomena, of the electrokinetic regime and of the stationary regime of the magnetic field. Formulation of Maxwell's system of equations, which allows solving any field or circuit problem under certain specified conditions, and presenting applications of special importance in the electrical field. General laws of electrotechnics: Law of magnetic circuit, Law of electromagnetic induction, Maxwell's equations.<br>▪ The laboratory activity is focused on applications specific to the chapters taught in the course and aims at the experimental verification of the basic relations for the encountered physical systems. The performance of laboratory works offers, in addition to the formation of skills in the electrical field, the use of physical and numerical modeling, sizing of assemblies, the correct use of measuring equipment, evaluation of errors in experimental determinations performed. Instruments: use of laboratory working methods, use of measurement techniques using the equipment provided, use of mathematical models for calculating errors, drawing graphs of variation and interpretation of the results obtained practically. |

**8. Contents***

| **8.1 Course** | Teaching methods | No. of hours |
|---|---|---|
| **CHAPTER 3. PERMANENTLY SINUSOIDAL ELECTRICAL CIRCUITS**<br>Joubert's theorem in complex form for magnetically coupled circuits<br>Kirchhoff's theorems, in complex, for magnetically coupled circuits | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| The power factor. Power factor compensation<br>Constructive solutions regarding the power factor compensation | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Complex representation of apparent power<br>Maximum power transfer theorem | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Solving alternating current circuits in permanent sinusoidal regime<br>Kirchhoff's theorem method. Algorithm. Features<br>Cyclic current method. Algorithm. Features | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Node potential method. Algorithm. Features<br>Transfiguration theorems.<br>Transfiguration of series connected circuits.<br>Transfiguration of parallel connected circuits. | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |

| | | |
|---|---|---|
| Resonance phenomena in alternating current circuits<br>Voltage resonance.<br>Current resonance | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| **CHAPTER 4. THREE-PHASE ELECTRICAL CIRCUITS**<br>Three-phase circuits and systems. Overview<br>Production of a symmetrical three-phase system of electromotive voltages. Three-phase circuit connections. Star connection of three-phase circuits.<br>Three-phase circuits receivers with/non neutral conductor<br>Electrical power in three-phase electrical circuits | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| **CHAPTER 5. LINEAR ELECTRICAL CIRCUITS IN PERIODIC NON-SINUSOIDAL REGIME**<br>Periodic non-sinusoidal regime. Generalities. Decomposition of periodic functions into Fourier series<br>Actual and average values of periodic functions. Coefficients characteristic of periodic functions | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Analysis of electrical circuits in permanent non-sinusoidal regime by decomposition into harmonics<br>Non-sinusoidal terminal voltage resistor<br>Voltage coil at non-sinusoidal terminals<br>Live capacitor at non-sinusoidal terminals<br>RLC circuits live at non-sinusoidal terminals<br>Powers in non-sinusoidal regime | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| **CHAPTER 6. LINEAR ELECTRICAL CIRCUITS IN TRANSITORY REGIME**<br>Generalities. The direct method<br>RL series circuits in transient mode. The direct method<br>RC series circuits in transient mode. The direct method | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Laplace transform method<br>Laplace transforms. Laplace transform theorems<br>Some details regarding the application of the Laplace transform in the study of electrical circuits | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| Operational form of electrical circuit equations. Operational impedances. Networks in null initial conditions<br>Networks in non-zero initial conditions | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| **CHAPTER 7. GENERAL ASPECTS ABOUT THE ELECTROMAGNETIC FIELD**<br>Terms and notions specific to the electromagnetic field in electrostatic regime, electrokinetics and stationary magnetic.<br>General laws of electromagnetic phenomena<br>Electrostatic potential theorem. Electric voltage<br>Law of temporary electric polarization.<br>The law of electric flux<br>The law of connection between D, E and p.<br>Law of conservation of free electric charge<br>The law of electrical conduction | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |
| The law of transformation of electromagnetic energy by conducting electric currents<br>The law of magnetic flux<br>The law of temporary magnetization<br>The law of connection between B, H and M<br>The law of the magnetic circuit<br>The law of electromagnetic induction<br>Specific applications of the studied regimes | Video projector, slides and whiteboard. Interactive teaching or Online internet connection | 2 |

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1. Iordache M., Perpelea M. – Analiza asistată de calculator a circuitelor electrice şi electronice neliniare complexe de mari dimensiuni, E.D.P Bucureşti, 1995

2. Iordache M., Dumitriu Lucia – Culegere de probleme, Circuite electrice neliniare, Problme, Algoritmi si programe de calcul, Bucureşti, 1996
3. Leuca T. - Circuite electrice şi aplicaţii, Editura Mediamira Cluj-Napoca, 1996
4. Leuca, T. – Elemente de teoria câmpului electromagnetic. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002.
5. Leuca T., **Carmen Molnar** - Circuite electrice. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002, pag. 440, ISBN 973-613-072-X.
6. Leuca T., Hănţilă F.I., Livia Bandici, **Carmen Molnar** - Bazele electrotehnicii. Editura Mediamira, Cluj–Napoca, 2007, pag.212, ISBN 978–973–713–189–8
7. Leuca T., **Carmen Otilia Molnar**, Arion M. N. – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014, pag. 472, ISBN 978-606-10-1284-8
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11. Maghiar, T., Leuca, T. - Electrotehnică, Probleme, vol. III, Litografia Universităţii din Oradea, 1993.
12. Maghiar, T., Leuca, T., Bondor K., Coroiu Laura, Silaghi Helga, Moldovan L., Silaghi M., Kocs Laura, Ţenţ M. - Electrotehnică, Editura Universităţii din Oradea, 1999.
13. Mocanu, C. I. - Teoria circuitelor electrice, Ed. Didactică şi Pedagogică, Bucureşti, 1979.
14. **Carmen O. Molnar** - Teoria câmpului electromagnetic, Editura Universităţii din Oradea, 2005, pag.223
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17. Moraru A. – Bazele electrotehnicii, Teoria câmpului electromagnetic, Ed. Matrix Rom, Bucureşti, 2002
18. Preda, M., Cristea, P. - Analiza şi sinteza circuitelor electrice, Ed. Tehnică Bucureşti, 1968
19. Răduleţ, R. - Bazele teoretice ale electrotehnicii, vol. I,II,III,IV, Ed. Energ. de Stat, Bucureşti, 1954-1956.
20. Răduleţ, R. - Bazele electrotehnicii, Probleme, vol. I,II,III, E.D.P., Bucureşti, 1958, 1981
21. Simion, E., Maghiar, T. - Electrotehnică, Ed. Didactică şi Pedagogică, Bucureşti, 1981
22. Şora, C.- Bazele electrotehnicii, Ed. Didactică şi Pedagogică, Bucureşti, 1982

| **8.2 Seminary** | Teaching methods | No. of hours |
|---|---|---|
| **8.2 Laboratory** | Teaching methods | No. of hours |
| Lab presentation. Theoretical notions of health and safety protection during practical activities from the laboratory. Alternative current | Aspects regarding the norms of health and safety protection during work in the electrical engineering laboratory are presented and discussed. The circuit elements, the measuring devices are presented | 2 |
| Study of capacitive circuits in alternating current. | With the help of DEGEM modules and measuring devices, the work with the same title is completed | 2 |
| Study of inductive circuits in alternating current. | | 2 |
| Study of RC circuits in alternating current. | | 2 |
| Study of RL circuits in alternating current | | 2 |
| Resonance of RLC circuits in alternating current | | 2 |
| Verification of knowledge | Verification test | 2 |

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1. Leuca, T., Molnar Carmen - Circuite electrice. Aplicaţii utilizând tehnici informatice, Editura Universităţii din Oradea, 2002.
2. Leuca, T. - Bazele electrotehnicii - îndrumător de laborator, litografiat Univ. din Oradea, 1991
3. Leuca T., **Carmen Otilia Molnar**, Arion M. N. – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014
4. **Molnar Carmen**, Arion M. – Electrotehnică. Aplicaţii practice – Editura Universităţii din Oradea, 2003.
5. Maghiar, T., Leuca, T., Silaghi, M., Marcu, D. - Circuite electrice liniare în regim permanent sinusoidal - îndrumător de laborator, litografiat Universitatea din Oradea, 1997.
6. Maghiar, T., Leuca, T., Silaghi, M., Coroiu Laura, Grava Adriana, Grava C.- Circuite electrice liniare de curent continuu - îndrumător de laborator, Editura Universităţii din Oradea, 2009
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8. Pantea M., Silaghi M. – Teoria câmpului electromagnetic, Îndrumător de laborator, Editura Universităţii din Oradea, 2011

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the subject is in accordance with the one in other national or international universities. In order to provide a better accomodation to the labour market requirements, there have been organized meetings both with representatives of the socio-economic environment and with academic staff with similar professional interest fields.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | - | Written and oral exam in the exam room or online with internet connection. | 70 % |
| 10.6 Seminary | - | - | - |
| 10.6 Laboratory | - | Knowledge assessment test | 30 % |
| 10.7 Minimum performance standard: Carrying out works and applications, in order to solve some problems specific to the electrical circuits, with the correct evaluation of the existing situation, of the available resources, in conditions of application and correct realization of the norms of safety and health at work. Principle of operation and composition of electrical circuits. Understanding electromagnetic phenomena | | | |

**Completion date:**
29.08.2022

Semnătura titularului de curs
**Conf.dr.ing. Carmen Molnar**
E-mail: cmolnar@uoradea.ro

Semnătura titularului de laborator

**Conf.dr.ing. Carmen Molnar**
E-mail: cmolnar@uoradea.ro

**Date of endorsement in the department:**

Department of Electrical Engineering

1.09.2022

Semnătura directorului de departament
**Prof.univ.dr.ing.inf. Francisc - Ioan HATHAZI**
E-mail: francisc.hathazi@gmail.com

Semnătură Decan
**Prof.univ.dr.ing. Mircea Ioan GORDAN**
E-mail: mgordan@uoradea.ro

**The beneficiary academic entity of the Discipline Sheet**

Department of Computers and Information Technology

Semnătura directorului de departament
**Conf.univ.dr.ing. Mirela PATER**
E-mail: mpater@uoradea.ro

**Date of endorsement in the Faculty Board:**

23.09.2022

Semnătură Decan
**Prof.univ.dr.ing. Mircea Ioan GORDAN**
E-mail: mgordan@uoradea.ro

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | Computer networks | | | | | |
| 2.2 Holder of the subject | | S.L. dr. ing. Florin Vancea | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | S.L. dr. ing. Florin Vancea | | | | | |
| 2.4 Year of study | IV | 2.5 Semester | VII | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | DD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 2 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 28 |
| Distribution of time | | | | | 69 h |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 15 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 14 |
| Tutorials | | | | | 4 |
| Examinations | | | | | 8 |
| Other activities. | | | | | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Video-projector, whiteboard or online platform.<br>Course can be face-to-face or online. |
| 5.2.for the development of the academic seminary/laboratory/project | Computer networks laboratory, with specific equipment or online resources.<br>Seminary/laboratory/project can be face-to-face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | ▪ C2.1 description of the structure and functioning of the basic components of computer networks<br>▪ C2.2 explaining of the role, interaction and functioning of the computer networks components<br>▪ C2.3 building software components for network-based communication systems<br>▪ C2.4 evaluation of the functional and non-functional basic characteristics of computer networks<br>▪ C4.1 identification of the defining base elements for the performance of computer networks<br>▪ C4.2 explaining the interaction of the basic factors which determine the performance of computer networks<br>▪ C4.3 applying the basic methods and principles for increasing computer networks performance |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ To provide basic competence in computer networks |
| 7.2 Specific objectives | ▪ To know the computer networks structure<br>▪ To know the specific problems and solutions for computer networks<br>▪ To know usual and current technologies in the field<br>▪ To acquire abilities in diagnosing and configuring network components<br>▪ To acquire abilities in developing software systems which include network communication |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Principles of machine-to-machine communication | Presentation, dialogue | 2 |
| Network types. Service types. Switching types. | Presentation, dialogue | 2 |
| Architectural models. ISO-OSI model – layers, primitives | Presentation, dialogue | 2 |
| TCP/IP model. UIT-T model | Presentation, dialogue | 2 |
| Physical layer – information POV, transmission types, coding techniques, media types | Presentation, dialogue | 2 |
| Physical layer – specific equipment, external resources available, PSTN, modulation/demodulation, multiplexing/demultiplexing. | Presentation, dialogue | 2 |
| Data link layer – functions, error protection, specific protocols, HDLC, PPP | Presentation, dialogue | 2 |
| Media access sublayer | Presentation, dialogue | 2 |
| LAN/MAN networks – transmission media, cabling, protocols, standards | Presentation, dialogue | 2 |
| Network layer – routing, congestion control | Presentation, dialogue | 2 |
| IP | Presentation, dialogue | 2 |
| Transport layer – service class, addressing, multiplexing, flow control | Presentation, dialogue | 2 |
| TCP/UDP | Presentation, dialogue | 2 |

| | | |
|---|---|---|
| Application layer protocols | Presentation, dialogue | 2 |
| Bibliography<br>A. S. Tannenbaum, Computer networks, Fourth Edition, Pearson 2002, ISBN-13: 9780130661029.<br>F. Vancea Transmisii de date şi reţele de calculatoare – curs, Universitatea din Oradea, 1997 | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Introduction to laboratory equipment and network diagnose methods | Presentation, experiments | 4 |
| Copper-based LAN. Ethernet. | Presentation, experiments | 4 |
| Optical-based LAN | Presentation, experiments | 4 |
| UDP communication | Presentation, experiments | 4 |
| TCP communication | Presentation, experiments | 4 |
| LAN evaluation | Presentation, experiments | 4 |
| Application protocols | Presentation, experiments | 4 |
| Bibliography<br>Laboratory guide, specific documentation | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- 

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>- For 10: | Final written paper<br>Evaluation can be face-to-face or online | 70% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>- For 10: | Continuous, during each activity.<br>Evaluation can be face-to-face or online | 30% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard: | | | |

| |
|---|
| Course:<br>Academic seminar:<br>Laboratory:<br>Project: |

**Completion date: 21.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Microprocessor systems** | | | | | |
| 2.2 Holder of the subject | | lect. dr. ing. Poszet Otto | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | lect. dr. ing. Poszet Otto | | | | | |
| 2.4 Year of study | 3 | 2.5 Semester | 1 | 2.6 Type of the evaluation | Ex. | 2.7 Subject regime | SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography, and handwritten notes | 22 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 4 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | 44 |
| **3.9 Total of hours per semester** | 100 |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | |
| 4.2 related to skills | Digital electronics I |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted face to face with a projector or online. |
| 5.2.for the development of the academic seminary/laboratory/project | The laboratory can be carried out face to face or online, |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | ▪ Design of hardware, software and communications components<br>▪ Design, life cycle management, integration and integrity of hardware, software and communication systems<br>▪ Maintenance and operation of hardware, software and communication systems<br>▪ Designing a memory block<br>▪ Design of an input/output interface<br>▪ Operation of a microsystem through the monitor program<br>▪ Working and troubleshooting the microsystem at machine code level<br>▪ Performing measurements with the oscilloscope in a microprocessor system<br>▪ Measuring the parameters of the memory circuits |
| Transversal skills | ▪ Honorable, responsible, ethical behavior, in the spirit of the law to ensure the reputation of the profession<br>▪ Clear and concise written description of the results in the field of activity<br>▪ Demonstrating the spirit of initiative and action to update professional knowledge |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Introduction and familiarization of students with the technique of designing microprocessor systems |
| 7.2 Specific objectives | ▪ Knowledge of the component parts of a microprocessor system<br>▪ Knowledge of the structural elements of a microprocessor<br>▪ Knowledge of the components needed to connect the microprocessor to the system<br>▪ Understanding how a bus works<br>▪ Knowing how to select memory circuits<br>▪ Knowledge of the types of memory circuits<br>▪ Understanding the types of inbound and outbound operations<br>▪ Knowledge of interface circuits |

**8. Contents**

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Introduction | Lecture | 2 |
| Internal data representation | Lecture | 2 |
| Representation of instructions and data in memory | Lecture | 2 |
| Central processing unit | Lecture | 2 |
| Microprocessor operation | Lecture | 2 |
| Microprocessor connections to the system | Lecture | 2 |
| Main memory | Lecture | 2 |
| Types of memory circuits and their use in microsystems | Lecture | 2 |
| Programmed transfer | Lecture | 2 |
| Interrupt transfer | Lecture | 2 |
| Typical parallel interfaces | Lecture | 2 |
| Serial interfaces | Lecture | 2 |
| Direct memory access (DMA) | Lecture | 2 |
| Timing circuits | Lecture | 2 |

Bibliography


1. Vari K. Ştefan: Microprocesoare şi microcalculatoare, Editura Universităţii din Oradea, ISBN 973-613-235-8, 2002.
2. Poszet O, Beuca M, Bumba M, Costea N, Madar D, Sferle R, Proiectare cu microprocesoare, Îndrumător de laborator, 2020 (format electronic), https://uoradea-my.sharepoint.com/personal/otto_poszet_didactic_uoradea_ro/_layouts/15/onedrive.aspx

3. B. B. Brey, The Intel Microprocesors. Architecture, Programming and Interfacing, Prentice Hall, 8th Edition, ISBN 978-8131726228, 2011.
4. S. Mueller, PC Repair and Upgrading, Que Publishing, 2015.
5. R. B. Reese, J. W. Bruce, Microcontrollers: from Assembly Language to C Using the PIC24 Family, Cengage Learning PTR, 2014.
6. T. Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes, 2009.
7. M. A. Mazidi, D. Causey, R. McKinlay, PIC Microcontroller and Embedded Systems, MicroDigitalEd, 2016
8. Walter Triebel, Avtar Singh, 8088 and 8086 Microprocessors : Programming, Interfacing, Software, Hardware, and Applications - 4th edition, ISBN13: 9780130452313, ISBN10: 0130452319, Publisher: Prentice Hall, Inc., Published: 2003
9. F. Dragomir, O. E. Dragomir, Programarea în limbaj de asamblare a microcontrolerelor, Matrix Rom, 2013.
10. Frederick M Cady, Microcontrollers and Microcomputers: Principles of Software and Hardware Engineering, Cady, F., Oxford University Press, 2010.
11. Michael Margolis, Arduino Cookbook: Recipes to Begin, Expand, and Enhance Your Projects Paperback – Illustrated, O'Reilly Media, 25 Jan. 2016, ISBN10:149190352X

| 8.2 Laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Presentation of laboratory and work protection. Structure and mode of operation of a microsystem (I) | Debate, measurements, processing of results | 2 |
| Structure and mode of operation of a microsystem (II) | Debate, measurements, processing of results | 2 |
| Clock signal and reset logic | Debate, measurements, processing of results | 2 |
| Microprocessor architecture and data representation | Debate, measurements, processing of results | 2 |
| Instruction cycle | Debate, measurements, processing of results | 2 |
| ROM memory | Debate, measurements, processing of results | 2 |
| Static RAM | Debate, measurements, processing of results | 2 |
| Dynamic RAM | Debate, measurements, processing of results | 2 |
| Interrupt system | Debate, measurements, processing of results | 2 |
| Step-by-step microprocessor operation | Debate, measurements, processing of results | 2 |

| | | |
|---|---|---|
| Parallel interface | Debate, measurements, processing of results | 2 |
| Programmable counter | Debate, measurements, processing of results | 2 |
| Serial interface | Debate, measurements, processing of results | 2 |
| Evaluation of laboratory activity | Presentation of reports, questions | 2 |

Bibliography


1. Vari K. Ştefan: Microprocesoare şi microcalculatoare, Editura Universităţii din Oradea, ISBN 973-613-235-8, 2002.
2. Poszet O, Beuca M, Bumba M, Costea N, Madar D, Sferle R, Proiectare cu microprocesoare, Îndrumător de laborator, 2020 (format electronic), https://uoradea-my.sharepoint.com/personal/otto_poszet_didactic_uoradea_ro/_layouts/15/onedrive.aspx
3. B. B. Brey, The Intel Microprocesors. Architecture, Programming and Interfacing, Prentice Hall, 8th Edition, ISBN 978-8131726228, 2011.
4. S. Mueller, PC Repair and Upgrading, Que Publishing, 2015.
5. R. B. Reese, J. W. Bruce, Microcontrollers: from Assembly Language to C Using the PIC24 Family, Cengage Learning PTR, 2014.
6. T. Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes, 2009.
7. M. A. Mazidi, D. Causey, R. McKinlay, PIC Microcontroller and Embedded Systems, MicroDigitalEd, 2016
8. Walter Triebel, Avtar Singh, 8088 and 8086 Microprocessors : Programming, Interfacing, Software, Hardware, and Applications - 4th edition, ISBN13: 9780130452313, ISBN10: 0130452319, Publisher: Prentice Hall, Inc., Published: 2003
9. F. Dragomir, O. E. Dragomir, Programarea în limbaj de asamblare a microcontrolerelor, Matrix Rom, 2013.
10. Frederick M Cady, Microcontrollers and Microcomputers: Principles of Software and Hardware Engineering, Cady, F., Oxford University Press, 2010.
11. Michael Margolis, Arduino Cookbook: Recipes to Begin, Expand, and Enhance Your Projects Paperback – Illustrated, O'Reilly Media, 25 Jan. 2016, ISBN10:149190352X


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The discipline provides theoretical and practical knowledge directly applicable in the computer industry and in the field of information technology services.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard | Written exam. The evaluation can be done face to face or online. | 90% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with | | |

| | | | |
|---|---|---|---|
| | the minimum performance standard | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard | Report. Questions. The evaluation can be done face to face or online. | Condition + 10% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: Pass mark from 50% of the requirements met.<br>Academic seminar:<br>Laboratory: Pass.<br>Project: | | | |

**Completion date:**
07.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Operating Systems** | | | | | |
| 2.2 Holder of the subject | | Prof. dr. ing. Gyorodi Robert Stefan | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Sef. Lucr. Dr. Inf. Costea Mirabela | | | | | |
| 2.4 Year of study | III | 2.5 Semester | 1 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | DD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 10 |
| Tutorials | 4 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **44** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions)<br>Computer programming and programming languages I |
| 4.2 related to skills | Structured programming in the C language |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer.<br>The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with video projector and computers that are connected to the internet. They have installed Dev C / C ++, Visual Studio 2019; Linux server with development tools using the C / C ++ language, |

| | |
|---|---|
| | CLion, Oracle VirtualBox for running virtual machines. The laboratory can take place face to face or online |
| **6. Specific skills acquired** | |
| Professional skills | C2. Designing hardware, software and communication components<br>C5. Designing, lifecycle management, integration and integrity of hardware, software and communication systems |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning the basics of operating systems and the possibilities of developing applications based on them. |
| 7.2 Specific objectives | ▪ Acquiring knowledge regarding the basic structure of operating systems, process concepts, threads, and process modeling methods, process synchronization, process interlocking issues, and process planning mechanisms. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introduction | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| 2 Structure of a Computer System | | 2 hours |
| 3 Structure of an Operating System. Operating System Services. Virtual Machines | | 2 hours |
| 4 System Design and Implementation | | 2 hours |
| 5 Processes. Process Operations. Cooperative Processes. Interprocess communication. Communication in Client-Server Systems | | 2 hours |
| 6 Threads. Multithreading Models. Windows Threads. Linux Threads, Java Threads | | 2 hours |
| 7 CPU planification | | 2 hours |
| 8 Process Synchronization | | 2 hours |
| 9 Interblocking Processes | | 2 hours |
| 10 Unix Operating System | | 2 hours |
| 11 The Main Unix Commands. Shell Procedures (Shell Scripts) | | 2 hours |
| 12 Unix Operating System Architecture | | 2 hours |
| 13 Interprocess Communication under the Unix Operating System | | 4 hours |

Bibliography


1. Sisteme de Operare. Teorie şi Aplicaţii – Robert Győrödi – Editura Universităţii din Oradea, 2000, ISBN 973-8083-22-2
2. Operating System Concepts Global 10th Ed - Abraham Silberschatz, Peter Galvin and Greg Gagne - John Wiley & Sons, Inc., 2019, ISBN 1119454085

| | | |
|---|---|---|
| 3. Operating Systems: Internals and Design Principles, 9/E - William Stallings - Pearson, 2018, ISBN 9781292214344<br>4. Modern Operating Systems: Global Edition, 4/E - Tanenbaum - Pearson – 2015, ISBN 1292061421<br>5. Distributed Systems, 3.01 - M. van Steen, A. S. Tanenbaum - 2017, ISBN 9789081540629<br>6. The Linux Programming Interface - Michael Kerrisk - No Starch Press - 2010, ISBN 978-1-59327-220-3<br>7. Hands-On System Programming with Linux - Kaiwan N Billimoria - Packt Publishing - 2018, ISBN 978-1-78899-847-5<br>8. PowerShell for SysAdmins - Adam Bertram - No Starch Press - 2020, ISBN 1593279183<br>9. https://e.uoradea.ro/course/view.php?id=6139 Materials (courses and laboratories) | | |
| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
| 1. Indirect Commands files in DOS | Powerpoint presentation with the help of the video projector/Oral presentation.<br><br>The students are assessed by a practical test using computer from laboratory topics. | 2 hours |
| 2. DOS interruptions | | 2 hours |
| 3. Calls of DOS System for working with I/O standard | | 2 hours |
| 4. Working with Directories / Folders | | 4 hours |
| 5. File Management by Logical Identifier | | 2 hours |
| 6. Process Management in DOS | | 4 hours |
| 7. Familiarization with UNIX operating system | | 2 hours |
| 8. UNIX Indirect Commands | | 2 hours |
| 9. The Process of Creating and Compiling a Program in UNIX | | 2 hours |
| 10. Working with files and process management in UNIX | | 2 hours |
| 11. Interprocess communication through messages | | 2 hours |
| 12. Final test | | 2 hours |
| Bibliography<br>1. **Győrödi Robert,** Mogyorosi Stefan "*Sisteme de Operare. Aplicatii practice*", Editura Universității din Oradea, 2008, ISBN 978-973-759-624-6, nr. pag 198.<br>2. https://e.uoradea.ro/course/view.php?id=6139 Materials (courses and laboratories) | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline corresponds to the requirements necessary to acquire the concepts underlying the design and implementation of an operating system.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved<br>- For 10: 100% of the subjects from the final exam should be correctly solved | Semester exam – written | 60% |
| 10.5 Academic seminar | Minimum required conditions for passing | - | - |

| | | | |
|---|---|---|---|
| | the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Oral/written | 40% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: 50% of the maximum score of the final exam<br>Academic seminar:<br>Laboratory: 50% of the maximum score of the laboratory evaluations<br>Project: | | | |

Course instructor

Head of department

**Completion date:**
**06.09.2022**

prof. dr. ing. Győrödi Robert
E-mail: rgyorodi@uoradea.ro

conf. dr. ing. Pater Mirela

**Date of endorsement in the department:**

**21.09.2022**

**Date of endorsement in the Faculty Board:**

**23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Fault-tolerant systems** | | | | | |
| 2.2 Holder of the subject | | prof. dr. ing. Vari-Kakas Ştefan | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | prof. dr. ing. Vari-Kakas Ştefan | | | | | |
| 2.4 Year of study | 4 | 2.5 Semester | 1 | 2.6 Type of the evaluation | Ex. | 2.7 Subject regime | SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 3 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/0 |
| 3.4 Total of hours from the curriculum | 42 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography, and handwritten notes | 36 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 4 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | 58 |
| **3.9 Total of hours per semester** | 100 |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | |
| 4.2 related to skills | Computer architecture |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted face to face with a projector or online. |
| 5.2.for the development of the academic seminary/laboratory/project | The laboratory can be carried out face to face or online, using personal computers. |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | ▪ Design of hardware, software and communications components<br>▪ Improving the performance of hardware, software and communication systems<br>▪ Design and integration of information systems using technologies and programming environments<br>▪ Design of fault-tolerant building blocks<br>▪ Modeling computer systems for reliability calculations<br>▪ Evaluation of the reliability and availability of computer systems<br>▪ Implementing tolerance through informational, structural, temporal and software redundancy<br>▪ Comparative analysis of different solutions applied to the design of complex fault-tolerant computing systems |
| Transversal skills | ▪ Honorable, responsible, ethical behavior, in the spirit of the law to ensure the reputation of the profession<br>▪ Demonstrating the spirit of initiative and action to update professional knowledge |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Knowledge of concepts and methods related to the design of fault-tolerant computer systems, as well as to evaluate their reliability |
| 7.2 Specific objectives | ▪ Knowledge of the principles of fault tolerance depending on the type of redundancy<br>▪ Knowledge of indicators for evaluating the availability of a computer system<br>▪ Knowledge of the basic structure of tolerant systems based on static, dynamic and hybrid hardware redundancy<br>▪ Understanding the mode of action and use of error detection and correction codes<br>▪ Knowledge of redundant software structures and the principles of self-testing systems<br>▪ Knowledge of actions and how to implement recovery techniques from the error state |

**8. Contents**

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Introduction | Lecture | 2 |
| Principles of fault tolerance | Lecture | 2 |
| Definition of reliability | Lecture | 2 |
| Predictive reliability of systems | Lecture | 2 |
| Repairable systems | Lecture | 2 |
| Reliability of programs | Lecture | 2 |
| Hardware redundancy | Lecture | 2 |
| Information redundancy | Lecture | 2 |
| Temporal redundancy | Lecture | 2 |
| Software redundancy | Lecture | 2 |
| Self-testing systems | Lecture | 2 |
| Error detection. Damage containment and assessment | Lecture | 2 |
| Error recovery | Lecture | 2 |
| Continuation of service | Lecture | 2 |

Bibliography

1. Vari K. Ştefan, Sisteme tolerante la defecte, Editura Universităţii din Oradea, 2001.
2. Vari K. Ştefan, Evaluarea fiabilităţii sistemelor de calcul, Editura Universităţii din Oradea, 2002.
3. I. Koren, C. Mani Krishna, Fault-Tolerant Systems, Morgan Kaufmann, 2009.

| | | |
|---|---|---|
| 4. Barry W. Johnson, Design and Analysis of Fault Tolerant Systems, Addison-Wesley, 1989.<br>5. Pankaj Jalote, Fault Tolerance in Distributed Systems, Prentice-Hall, 1994. | | |
| 8.2 Laboratory | Teaching methods | No. of hours/ Observations |
| Introduction. Fault tolerance and its applications. | Exemplification, debate, problem solving | 2 |
| Reliability. Reliability calculation using reliability block diagrams | Exemplification, debate, problem solving | 2 |
| Reliability analysis using Markov chains | Exemplification, debate, problem solving | 2 |
| Design techniques to ensure fault tolerance. Hardware redundancy | Exemplification, debate, problem solving | 2 |
| Ensuring fault tolerance. Information redundancy (I) | Exemplification, debate, problem solving | 2 |
| Ensuring fault tolerance. Information redundancy (II) | Exemplification, debate, problem solving | 2 |
| Evaluation of laboratory activity | Presentation of reports, questions | 2 |
| Bibliography<br>1. Vari K. Ştefan, Evaluarea fiabilităţii sistemelor de calcul, Editura Universităţii din Oradea, 2002.<br>2. Vari K. Ştefan, R. Ţirtea, Fascicole de lucrări de laborator, 2009.<br>3. Online simulators: http://www.ecs.umass.edu/ece/koren/FaultTolerantSystems/simulator/ | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The discipline provides theoretical and practical knowledge directly applicable in the computer industry and in the field of information technology services.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard | Written exam. | 90% |
| 10.5 Academic seminar | | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard | Reports assessment.<br>Questions. | Condition + 10% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: Pass mark from 50% of the requirements met.<br>Academic seminar: | | | |

| |
|---|
| Laboratory: Pass.<br>Project: |

**Completion date:**
12.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and information technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Information technology / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **General economy** | | | | | |
| 2.2 Holder of the subject | | **Assoc.prof. PhD eng.ec. Liliana Doina Măgdoiu** | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **Lecturer PhD eng.ec. Zoltan Kovendi** | | | | | |
| 2.4 Year of study | **IV** | 2.5 Semester | **7** | 2.6 Type of the evaluation | **VP** | 2.7 Subject regime | **CD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **3** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **42** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **14** |
| Distribution of time | | | | | 69h |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 5 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 10 |
| Tutorials | | | | | |
| Examinations | | | | | 4 |
| Other activities. | | | | | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **33** |
| **3.9 Total of hours per semester** | **75** |
| **3.10 Number of credits** | **3** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - attending at least 50% of the course<br>- the course can be held face to face or online |
| 5.2.for the development of the academic seminar/laboratory/project | - mandatory presence at all seminar hours;<br>- students come with observed seminar papers<br>- a maximum of 3 seminars can be recovered during the semester (30%);<br>- attendance at seminar hours below 70% leads to the restoration of the discipline |

| | |
|---|---|
| | - the seminar can be held face to face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | **C6.** Apply knowledge of law, economics, marketing, business and quality assurance in the economic and managerial contexts. |
| Transversal skills | **TC3.** Identify training opportunities and efficient use of resources and learning techniques for their own development |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Familiarization of students with the main types of processes and economic phenomena. |
| 7.2 Specific objectives | ▪ The course aims to present the theoretical elements of general economics<br>▪ The seminar acquaints the students with practical aspects regarding the economic-financial flows at business level, the management of the economic and financial phenomenon |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| **Chapter 1. The object of political economy** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 2. The legal character of the economy** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 3. The economic activity** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 4. Economic needs and interests** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 5. Company** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 6. Consumer behavior** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 7. Market** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 8. Economic competition** | Free exposure, | 2 h |

| | | |
|---|---|---|
| | with the presentation on-line | |
| **Chapter 9. Selling prices** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 10. Income, Consumption and the saving process** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 11. Economic growth** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 12. The profit of the entrepreneur** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 13. Cyclicality of economic activities** | Free exposure, with the presentation on-line | 2 h |
| **Chapter 14. Relations with the international market** | Free exposure, with the presentation on-line | 2 h |
| **Total** | | **28 h** |

Bibliography


1. Rada, Ioan Constantin, **Economie**, Ed. Anotimp, 2002
2. Rada, Ioan Constantin; Rada, Ioana Carmen, **Economie. Caiet de lucrări**, Ed. Anotimp & Adsumus, 2002
3. Rada, Ioan Constantin; Bodog, Simona;Rada, Ioana Carmen; Lăzurean, Elena Nicoleta, **Economie generală, Marketing industrial (note de curs)**, Ed. Universităţii Oradea, 2006
4. Rada, Ioan Constantin; Bodog, Simona;Rada, Ioana Carmen; Lăzurean, Elena Nicoleta, **Economie generală, Marketing industrial (aplicaţii pentru seminar)**, Ed. Universităţii Oradea, 2006
5. Rada**,** Ioan Constantin, **Economie generală I**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2009,CD-ROM
6. Rada**,** Ioan Constantin, **Economie generală II**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2009,CD-ROM
7. Rada, Ioan Constantin, **Microeconomie. Idei moderne. Vol. I**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2007
8. Rada, Ioan Constantin, **Microeconomie. Idei moderne. Vol. II**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2008
9. Rada, Ioan Constantin; Rica, Ivan; Măgdoiu**,** Liliana Doina, **Finanţe şi credit (note de curs)**, Editura Universităţii din Oradea, 2011, CD-ROM
10. Rada, Ioan Constantin; Rica, Ivan; Măgdoiu, Liliana Doina**, Finanţe şi credit (aplicaţii pentru seminar)**, Editura Universităţii din Oradea, 2011, CD-ROM
11. Nagy, Ştefan; Rada, Ioan Constantin, **Sisteme avansate de producţie (note de curs)**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2008, CD-ROM
12. Nagy, Ştefan; Rada,Ioan Constantin, **Sisteme avansate de producţie (aplicaţii)**, Editura Asociaţiei „Societatea Inginerilor de Petrol şi Gaze", Bucureşti, 2008, CD-ROM


| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Paper: Consumer concepts<br>2. Report: About resources | Students receive homework for the seminar papers or | 2 h<br>2 h |

| | | |
|---|---|---|
| 3. Paper: The concept of competition<br>4. Paper: The role of the environment in obtaining production factors<br>5. Report: The information system of the enterprise<br>6. Paper: Substantiation of production cost decisions<br>7. Report: The production price and the profit of the entrepreneur | choose their homework at least a week in advance, study, design the papers and present them at the seminar. Appreciations and comments are made under the guidance of the teacher. | 2 h<br>2 h<br>2 h<br>2 h<br>2 h |
| **Total** | | **14 h** |
| Bibliography<br>It is the one indicated for the course | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Information technology from other university centers that have accredited these specializations ("Politehnica" University of Timisoara, Technical University of Cluj-Napoca, Gh. Asachi Iasi, etc.), and knowledge the main types of processes and economic phenomena at microeconomic level, the theoretical elements of microeconomics and practical aspects regarding the economic-financial flows at business level, the management of economic and financial phenomenon is a stringent requirement of any employer in the field (Faist Mekatronics, Celestica, Comau, GMAB etc).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | - for grade 5 it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>- for grade 10, a thorough knowledge of all subjects is required | Written exam<br>Students receive pre-arranged topics for solving | 70% |
| 10.5 Seminar | - for note 5, it is necessary to know the structure of the paper and one or two notions from the paper<br>- for grade 10, the detailed knowledge of the issue and its support during the seminar | At each seminar, the students prepare a report, which can be collective, which they support and which is submitted to the debates during the seminars. Each student also receives a grade for the seminar activity during the semester | 30% |
| 10.6 Minimum performance standard:<br>Course: - Solving and explaining problems of medium complexity, associated with the discipline of microeconomics or general economics, specific to the field of engineering and management<br>- Participation in at least half of the courses.<br><br>Seminar: - Designing economic-financial processes at business level, for a given situation<br>- Participation in all seminar work. | | | |

**Completion date:** 11.09.2020

**Date of endorsement in the department:** 24.09.2020

**Date of endorsement in the Faculty Board:** 28.09.2020

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers/ Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **Modern Languages – English (1)** | | | |
| 2.2 Holder of the subject | | | | **Lecturer PhD. Abrudan Caciora simona Veronica** | | | |
| 2.3 Holder of the academic laboratory/project | | | | | | | |
| 2.4 Year of study | **I** | 2.5 Semester | **1** | 2.6 Type of the evaluation | **PE** | 2.7 Subject regime | **CD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **1** | of which: 3.2 course | | 3.3 academic seminar /laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **14** | Of which: 3.5 course | | 3.6 academic seminar/ laboratory/project | **14** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 36 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 12 |
| Tutorials | 18 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **36** |
| **3.9 Total of hours per semester** | **50** |
| **3.10 Number of credits** | **2** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Basic knowledge of English |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | |
| 5.2.for the development of the academic laboratory/project | - Mandatory presence at 80% of the seminars;<br>- The seminar can be carried out face to face or online |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | |
| Transversal skills | **CT3.** Effective use of information sources and resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses. |
| 7.2 Specific objectives | • Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study |

**8. Contents***

| 8.2 Seminar | Teaching methods | No. of hours/ Observations |
|---|---|---|
| **Chapter 1 Introductory seminar.** Test for the evaluation of students'level of English language skills. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter Drawings in engineering: Drawing types and scales** Reading. Vocabulary and conversation exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 3**: **Types of views used in engineering drawings**.Vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

| | | |
|---|---|---|
| **Chapter 4. Design development: the initial design phase. Collaborative development of engineering projects**. Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 5. The degrees of comparison for adjectives and adverbs** (revision exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 6: Engineering Design. Technical Drawing in Engineering. Types of Views Used in Engineering Drawing.** Listening and speaking exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 7: Design objectives and design calculations.** Vocabulary and speaking exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 8: Expressing dimensions of circles (key dimensions of circles, expressing the dimensions of pipes and ducts).** Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 9: Dimensional accuracy. Discussing the concepts of precision and tolerance in engineering.** Vocabulary and speaking exercises | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 10: Expressing numbers and calculations. Decimals and fractions. Addition, subtraction, multiplication and division. (**Listening and vocabulary exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 11: Expressing area, size and mass. Referring to weight, mass, volume and density.**. (Reading and exercises) | Free exposure, with the presentation of the course with video projector, on the board or | 1h |

| | | |
|---|---|---|
| | online | |
| **Chapter 12: Measurable parameters. Defining the concepts of supply, demand, capacity, input, output and efficiency in relation to the engineering domain**. (Reading and conversation exrcises**)** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 13: 3D component features (referring to 3D forms of edges and joints and the 3D forms of fasteners)** Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 14: Revision of the concepts relating to the engineering domain discussed during the semester.** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

References:


Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering,* Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Benţea Violeta, *A Practical Course In English Science and Technology ,* Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline can be found in the curriculum of Automatics and Applied Informatics and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.) and knowledge of Technical Engish requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods The evaluation can be done face-to-face or online | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Seminar | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>For 10: thorough knowledge of all subjects is required | **Written exam**<br>Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester | 100 % |
| 10.6 Minimum performance standard:<br>Seminary:<br>Capacity to use English in an appropriate way, depending on the context<br>Capacity to produce any of the documents, written in English, presented and discussed during the seminaries<br>Capacity to use grammatical structures accurately | | | |

**Completion date:**
01.09.2020

**Date of endorsement in the department:**
15.09.2020

**Date of endorsement in the Faculty Board:**
28.09.2020

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computer Science** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computer Science / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **Modern Languages – English (1I)** | | | |
| 2.2 Holder of the subject | | | | **Lecturer PhD. Abrudan Caciora simona Veronica** | | | |
| 2.3 Holder of the academic laboratory/project | | | | | | | |
| 2.4 Year of study | **I** | 2.5 Semester | **1I** | 2.6 Type of the evaluation | **PE** | 2.7 Subject regime | **CD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | | of which: 3.2 course | | 3.3 academic seminar /laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | | Of which: 3.5 course | | 3.6 academic seminar/ laboratory/project | **14** |

| | |
|---|---|
| Distribution of time | 50 |
| Study using the manual, course support, bibliography and handwritten notes | 22 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 11 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 11 |
| Tutorials | 4 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **36** |
| **3.9 Total of hours per semester** | **50** |
| **3.10 Number of credits** | **2** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Basic knowledge of English |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | |
| 5.2.for the development of the academic laboratory/project | - Mandatory presence at 80% of the seminars;<br>- The seminar can be carried out face to face or online |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | |
| Transversal skills | **CT3.** Effective use of information sources and resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses. |
| 7.2 Specific objectives | • Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study |

**8. Contents***

| 8.2 Seminar | Teaching methods | No. of hours/ Observations |
|---|---|---|
| **Chapter 1 Material types: Metals and non-metals. Elements, compounds and mixtures. Composite materials.** Vocabulary and speaking exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter Polymers. Natural and synthetic polymers. Thermoplastics and thermosetting plastics.** Reading. Vocabulary and conversation exercises. Revision of numerals. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 3**: **Material properties (I). Tensile strength and deformation. Elasticity and plasticity. Stages in elastic and plastic deformation**.Vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

| | | |
|---|---|---|
| **Chapter 4. Material properties (I). Hardness. Fatigue, fracture toughness and creep. Basic thermal properties**. Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 5. Interconnection: vocabulary relating to attaching and supporting and fitting together different parts, specific to the engineering domain.** (revision exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 6: Mechanical fasteners (I). Bolts. Preload in bolted joints. Washers.** Listening and speaking exercises. Revision: Countable and uncountable nouns. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 7: Mechanical fasteners (2). Screws. Screw anchors and rivets..** Vocabulary and speaking exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 8: Non-mechanical joints: welding, brazing, soldering, adhesives**. Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 9: Referring to types of force and deformation. The concept of failure in engineering** Vocabulary and speaking exercises | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 10: Expressing numbers and calculations. Decimals and fractions. Addition, subtraction, multiplication and division. (**Listening and vocabulary exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 11: Referring to the electrical supply. Direct current and alternating current. AC generation and supply. DC generation and use.**. (Reading and exercises) | Free exposure, with the presentation of the course with video projector, on the board or | 1h |

| | | |
|---|---|---|
| | online | |
| **Chapter 12: Referring to circuits and components. Simple circuits. Mains AC circuits and switchboards. Printed and integrated circuits. Electrica land electronic components.** (Reading and conversation exrcises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 13: Referring to engines and motors. Types and functions of engines and motors.** Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 14: Referring to energy and temperature. Forms of energy. Energy efficiency. Work and power.** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

References:


Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering,* Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Benţea Violeta, *A Practical Course In English Science and Technology ,* Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline can be found in the curriculum of Automatics and Applied Informatics and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.) and knowledge of Technical Engish requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods The evaluation can be done face-to-face or online | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Seminar | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>For 10: thorough knowledge of all subjects is required | **Written exam**<br>Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester | 100 % |
| 10.6 Minimum performance standard:<br>Seminary:<br>Capacity to use English in an appropriate way, depending on the context<br>Capacity to produce any of the documents, written in English, presented and discussed during the seminaries<br>Capacity to use grammatical structures accurately | | | |

**Completion date:**
01.09.2020

**Date of endorsement in the department:**
15.09.2020

**Date of endorsement in the Faculty Board:**
28.09.2020

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Modern Languages – English (3)** | | | | |
| 2.2 Holder of the subject | | | **Lecturer PhD. Abrudan Caciora simona Veronica** | | | | |
| 2.3 Holder of the academic laboratory/project | | | | | | | |
| 2.4 Year of study | **II** | 2.5 Semester | **3** | 2.6 Type of the evaluation | **PE** | 2.7 Subject regime | **CD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **1** | of which: 3.2 course | | 3.3 academic seminar /laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **14** | Of which: 3.5 course | | 3.6 academic seminar/ laboratory/project | **14** |
| Distribution of time | | | | | 50 |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 15 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 15 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 15 |
| Tutorials | | | | | 3 |
| Examinations | | | | | 2 |
| Other activities. | | | | | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **36** |
| **3.9 Total of hours per semester** | **50** |
| **3.10 Number of credits** | **2** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Basic knowledge of English |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | |
| 5.2.for the development of the academic laboratory/project | - Mandatory presence at 80% of the seminars;<br>- The seminar can be carried out face to face or online |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | |
| Transversal skills | **CT3.** Effective use of information sources and resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses. |
| 7.2 Specific objectives | • Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study |

**8. Contents***

| 8.2 Seminar | Teaching methods | No. of hours/ Observations |
|---|---|---|
| **Chapter 1 Electric Light Sources. Incandescent lamps. Halogen Lamps.** Vocabulary exercises and discussion. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 2. Gerunds and Participles.** Revision. Vocabulary and conversation exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 3** : **Low-pressure and High-pressure Discharge Lamps.** Revision and application exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

| | | |
|---|---|---|
| **Chapter 4. Infinitives (Revision)**. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 5. Electric Power Distribution Systems. The Electric Circuit. Induction Heating** (Writing and rephrasing exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 6: Computer Games Today.** Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 7: Changing the Structure of Information in a Sentence: the Passive Voice**. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 8: Electric Machines: Electric Motors, Electric Generators. Transformers.** Reading, Speaking. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 9: Review of Conditional Sentences.** | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 10: Distribution Boards. (**Listening and vocabulary exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 11: The Subjunctive Mood**. (Revision and exercises) | Free exposure, with the presentation of the course with video projector, on the board or | 1h |

| | | |
|---|---|---|
| | online | |
| **Chapter 12: Considerations on Electric Power Conversion**.. (Reading and conversation exrcises**)** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 13: DC to DC Conversion. AC to DC Conversion.** (Revision and exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 14: The distribution of electricity.** Lectura de text si exercitii de vocabular**.** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

References:


Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering,* Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Benţea Violeta, *A Practical Course In English Science and Technology ,* Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

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**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods The evaluation can be done face-to-face or online | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Seminar | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>For 10: thorough knowledge of all subjects is required | **Written exam**<br>Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester | 100 % |
| 10.6 Minimum performance standard:<br>Seminary:<br>Capacity to use English in an appropriate way, depending on the context<br>Capacity to produce any of the documents, written in English, presented and discussed during the seminaries<br>Capacity to use grammatical structures accurately | | | |

**Completion date:**
09.09.2020

**Date of endorsement in the department:**
24.09.2020

**Date of endorsement in the Faculty Board:**
28.09.2020

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Modern Languages – English (4)** | | | | |
| 2.2 Holder of the subject | | | **Lecturer PhD. Abrudan Caciora simona Veronica** | | | | |
| 2.3 Holder of the academic laboratory/project | | | | | | | |
| 2.4 Year of study | **II** | 2.5 Semester | **4** | 2.6 Type of the evaluation | **PE** | 2.7 Subject regime | **CD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **1** | of which: 3.2 course | | 3.3 academic seminar /laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **14** | Of which: 3.5 course | | 3.6 academic seminar/ laboratory/project | **14** |
| Distribution of time | | | | | 50 |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 15 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 15 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 15 |
| Tutorials | | | | | 3 |
| Examinations | | | | | 2 |
| Other activities. | | | | | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **36** |
| **3.9 Total of hours per semester** | **50** |
| **3.10 Number of credits** | **2** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Basic knowledge of English |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | |
| 5.2.for the development of the academic laboratory/project | - Mandatory presence at 80% of the seminars;<br>- The seminar can be carried out face to face or online |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | |
| Transversal skills | **CT3.** Effective use of information sources and resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses. |
| 7.2 Specific objectives | • Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study |

**8. Contents***

| 8.2 Seminar | Teaching methods | No. of hours/ Observations |
|---|---|---|
| **Chapter 1 Computer Modeling and Software Used in Electrical Engineering**.Vocabulary exercises and discussion. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 2. Computational electromagnetics (electromagnetic modeling): FDTD, FEM, BEM.** Vocabulary and conversation exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 3** : **Programming Languages. L**istening exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

| | | |
|---|---|---|
| **Chapter 4. Simulation Software.** Reading and vocabulary exerecises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 5. AutoCAD.** (Reading and writing exercises. Writing a report) | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 6: COMSOL Multiphysics.** Reading a d vocabuary exercises**.** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 7: Mathcad.** Speaking exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 8: MATLAB.** Reading and vocabulary exercises. | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 9: Professional ethics.** (Discussing aspects relating to the idea of ethics in the engineering domain. Vocabulary related to ethics, rights, laws, etc) | Free exposure, with the presentation of the course with video projector, on the board or online | 1 h |
| **Chapter 10: Finding a Job in the field of Electrical Engineering**. (Vocabulary relating to persuasion techniques). | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 11: Listening: Hisotry of Electrical Engineering.** | Free exposure, with the presentation of the course with video projector, on the board or | 1h |

| | | |
|---|---|---|
| | online | |
| **Chapter 12: Speaking: Job interview**. (Speaking, role-play and presentation of arguments**)** | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 13: Writing Leaflets Promoting Education in Electrical Engineering.** (Writing and vocabulary exercises) | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |
| **Chapter 14: Revision of concepts discussed throughout the semester.** (Vocabulary exercises). | Free exposure, with the presentation of the course with video projector, on the board or online | 1h |

References:


Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering,* Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Benţea Violeta, *A Practical Course In English Science and Technology ,* Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline can be found in the curriculum of Automatics and Applied Informatics and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.) and knowledge of Technical Engish requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods The evaluation can be done face-to-face or online | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Seminar | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>For 10: thorough knowledge of all subjects is required | **Written exam**<br>Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester | 100 % |
| 10.6 Minimum performance standard:<br>Seminary:<br>Capacity to use English in an appropriate way, depending on the context<br>Capacity to produce any of the documents, written in English, presented and discussed during the seminaries<br>Capacity to use grammatical structures accurately | | | |

**Completion date:**
09.09.2020

**Date of endorsement in the department:**
24.09.2020

**Date of endorsement in the Faculty Board:**
28.09.2020

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **Computer programming and programming languages I** | | | |
| 2.2 Holder of the subject | | | | **Prof. dr. ing. Győrödi Cornelia Aurora** | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | Sef. Lucr. Dr. Inf. Bolojan Octavia<br>Inf. Costea Mirabela | | | |
| 2.4 Year of study | I | 2.5 Semester | 1 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | FD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 30 |
| Tutorials | 7 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | 5 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer - The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that have installed DevC ++, Visual Studio 2019 and those are connected to the internet. The laboratory can take place face to face or online |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | C2. Designing hardware, software and communication components<br><br>Fundamental concepts regarding structured programming in the C language. |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning the basics of structured programming in the C language and training the skills needed to design high-performance and portable software. |
| 7.2 Specific objectives | ▪ Acquiring knowledge in the C language for writing programs that use a variety of data types specific to programming problems, use language modularization facilities, use different program control structures, use vectors and pointers to solve problems effectively, including structured data types in the solution of the problem. You will create their own data types and use functions from the C language libraries, as well as functions working with files. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| CHAPTER.1. Introduction<br>- Structured programming<br>- Representation by logical schemes of algorithms | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| CHAPTER.2. Introduction to programming in the C language | | 2 hours |
| CHAPTER.3. Structured programming in the C language | | 2 hours |
| CHAPTER.4. Control structures in the C language | | 2 hours |
| CHAPTER.5. Variables, operators and expressions in the C language | | 2 hours |
| CHAPTER.6. Functions | | 2 hours |
| CHAPTER 7. Arrays | | 2 hours |
| CHAPTER 8. Pointers | | 2 hours |
| CHAPTER 9. Characters and Strings | | 2 hours |
| CHAPTER 10. Structures, Unions, Bit Manipulations, and Enumerations | | 2 hours |
| CHAPTER 11. Recursion. Dynamic structures | | 2 hours |
| CHAPTER 12. Input/Output (I/O) functions for files | | 4 hours |

Bibliography


1. **Győrödi Cornelia,** Győrödi Robert**,** Pecherle George, "*Programarea în limbajul C. Teorie și Aplicații*", Editura Universității din Oradea, 2015, ISBN 978-606-10-1522-1, nr. pag 250.
2. H.M. Deitel, P.J. Deitel , *C How to Program, With Case Studies Introducing Applications and Systems Programming, 9th edition,* ISBN-13: 9780137454372, 2021, Editura Pearson

<table>
<tr><td colspan="3">
3. H.M. Deitel, P.J. Deitel, C How to Program 8th edition, 2016, Editura Pearson, link: C: How to Program 8th Edition – H.M. Deitel, P.J. Deitel – 2016, Pearson – ISBN 978-0133976892<br>
4. Programming: Principles and Practice Using C++ (2nd Edition), Bjarne Stroustrup, May 25, 2014, Addison-Wesley, ISBN - 978-0321992789.<br>
5. The Joy of C 3rd Edition – L.H. Miller, A.E. Quilici – 1997 Wiley – ISBN 047112933x<br>
6. Data Structures, Algorithms & Software Principles in C – Thomas A. Standish – 1995 Addison-Wesley – ISBN 0201591189<br>
7. Cursul in format electronic poate fi accesat de pe platforma e.uoradea.ro de la adresa https://e.uoradea.ro/course/view.php?id=20604
</td></tr>
<tr><td>8.2 Academic laboratory</td><td>Teaching methods</td><td>No. of hours/ Observations</td></tr>
<tr><td>1. Presentation of the DevC ++ programming environment. Writing algorithms using logic schemes.</td><td rowspan="14">Oral presentation<br><br>The students work with the Dev-C ++ programming environment (or alternatives such as Code Blocks, Visual C ++, etc.)<br>The materials (courses and laboratories) are posted on an elearning platform, available at http://e.uoradea.ro, where students have access by username and password. Also, by the online platform, they send the solved assignments from each laboratory.<br><br>The students are assessed by a practical test using computer from laboratory topics.</td><td>2 hours</td></tr>
<tr><td>2. Introduction to programming in the C language. Writing a program in the C language. Debug of programs. Important errors. Header files, project files.</td><td>2 hours</td></tr>
<tr><td>3. The Selection statements.</td><td>2 hours</td></tr>
<tr><td>4. Control structures in the C language. The Repetitive statements: for, while, do / while. The Break and continue statements.</td><td>2 hours</td></tr>
<tr><td>5. Variables, operators and expressions in the C language</td><td>2 hours</td></tr>
<tr><td>6. Functions</td><td>2 hours</td></tr>
<tr><td>7. Arrays</td><td>2 hours</td></tr>
<tr><td>8. Pointers</td><td>2 hours</td></tr>
<tr><td>9. Characters and Strings</td><td>2 hours</td></tr>
<tr><td>10. Structures, Unions, Bit Manipulations, and Enumerations</td><td>2 hours</td></tr>
<tr><td>11. Recursion. Dynamic structures</td><td>2 hours</td></tr>
<tr><td>12. Input/Output (I/O) functions for files</td><td>4 hours</td></tr>
<tr><td>13. Final test</td><td>2 hours</td></tr>
<tr><td colspan="3">Bibliography
<ol>
<li>H.M. Deitel, P.J. Deitel , C How to Program, With Case Studies Introducing Applications and Systems Programming, 9th edition, ISBN-13: 9780137454372, 2021, Editura Pearson</li>
<li>Győrödi Cornelia Aurora - “Programare în limbajul C” – Indrumător de laborator în format electronic, 2019</li>
<li>C: How to Program 8th Edition – H.M. Deitel, P.J. Deitel – 2016, Pearson – ISBN 978-0133976892</li>
<li>Programming: Principles and Practice Using C++ (2nd Edition), Bjarne Stroustrup, May 25, 2014, Addison-Wesley, ISBN - 978-0321992789.</li>
<li>Győrödi Cornelia, Győrödi Robert, Pecherle George, “Programarea în limbajul C. Teorie și Aplicații”, Editura Universității din Oradea, 2015, ISBN 978-606-10-1522-1, nr. pag 250.</li>
<li>https://e.uoradea.ro/course/view.php?id=6127</li>
</ol></td></tr>
</table>

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- 

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved | Semester exam – written | 66% |

| | | | |
|---|---|---|---|
| | For 10: 100% of the subjects from the final exam should be correctly solved | | |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Oral/written | 34% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: 50% yield by summing scores from the final exam<br>Academic seminar:<br>Laboratory: 50% yield by summing scores from the laboratory test<br>Project: | | | |

Course instructor

Head of department

**Completion date:**
**05.09.2022**

prof. dr. ing. Cornelia Győrödi
E-mail: cgyorodi@uoradea.ro

conf. dr. ing. Pater Mirela

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Applied Informatics I** | | | | |
| 2.2 Holder of the subject | | | **Pater Alexandrina Mirela** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **Pater Alexandrina Mirela** | | | | |
| 2.4 Year of study | I | 2.5 Semester | 1 | 2.6 Type of the evaluation | Vp | 2.7 Subject regime | FD - Fundamental Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 21 |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | 5 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer. The course can be held face to face or online. |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that are connected to the Internet. The laboratory / project can be held face to face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | CP1. Operating with scientific, engineering and informational fundaments<br>CP3. Solving problems using computer science and engineering instruments |
| Transversal skills | CT1. Honorable, responsibleand ethical behavior, respecting the spirit of the law, to ensure the reputation of the profession. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The course and the laboratory aim to familiarize students with computer science, computer systems and computer systems. Types of computer and information systems, methods of representation and processing of information, design and writing of an algorithm and the corresponding logic scheme are presented. It presents the general and functional hardware structure of a computer system, as well as the general architecture of an operating system. Archiving / unarchiving programs and virus / antivirus programs and internet communications are also presented. |
| 7.2 Specific objectives | **Theoretical knowledge:**<br>• Information systems, informatics<br>• Information representation, numbering systems<br>• Understand and know the techniques for designing and implementing a problem-solving algorithm using pseudocode and logic diagrams<br>• Description of the structure and operation of hardware, software and communications components<br>• Explaining the role, interaction and operating principles of the components of hardware, software and communication systems<br>• Carrying out projects on areas of knowledge<br>**Skills acquired:**<br>• To understand the basic principles of the operation of a computer system, knowing its main components.<br>• To solve various problems using the design and implementation techniques of a problem solving algorithm using pseudocode and logic diagrams |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Information systems. Computer systems | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 2. Arithmetic basics of computers. | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 3. Algorithms | Powerpoint presentation with the help of the video | 6 hours |

| | | |
|---|---|---|
| | projector; free discussions; | |
| Chapter 4. Computing Systems | Powerpoint presentation with the help of the video projector; free discussions; | 8 hours |
| Chapter 5. Computer networks | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 6. Operating systems | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 7. Utility programs | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 8. The internet. Internet services | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 9. Principles of program design | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |

Bibliography


- Behrouz Forouzan, *Foundation of Computer science*, forth edition, Cencage Learning, EMEA, 2020
- Behrouz Forouzan, *Foundation of Computer science*, third edition, Cencage Learning, EMEA, 2014
- Dorian Gorgan, Gheorghe Sebestyen, *Structura Calculatoarelor*, Ed. Albastra, Cluj-Napoca, 2000
- Grigore Albeanu, *Sisteme De Operare*, Editura Petrion, Bucureşti, 1996
- Radu Mârşanu, *Sisteme De Calcul*, Editura Teora, Bucureşti, 1996
- Emanuela Cerchez, Marinel Şerban, *Sisteme De Calcul,* Bucureşti 1998
- J. Glenn Brookshear, *Introducere În Informatica,* Editura Teora, Bucureşti 1998
- Microsoft Corporation, *Microsoft Office*
- Mirela Pater, *Introducere În Ştiinţa Calculatoarelor,* Editura Universităţii Din Oradea, Oradea, 2001
- Mirela Pater, *Introducere În Ştiinţa Sistemelor De Calcul,* Editura Universităţii Din Oradea, Oradea, ISBN 978-973-759-494-5, 266 pag., 2008
- Mirela Pater, *Introducere În Ştiinţa Sistemelor De Calcul,* format electronic, 2013

https://uoradea-my.sharepoint.com/personal/alexandrina_pater_didactic_uoradea_ro/Documents/ISSC%20editie%20electronica%202013.pdf


| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Labor protection training<br>Computer network overview, input / output commands in / from the network. Presentation and | Powerpoint presentation with the help of the video | 2 hours |

| | | |
|---|---|---|
| use of disk structure, directory and file concepts, password setting command for the current directory | projector; free discussions; | |
| Numbering systems | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Algorithms. Logical schemes and pseudocode language | Powerpoint presentation with the help of the video projector; free discussions; | 10 hours |
| Realization of technical editing and editing project | Powerpoint presentation with the help of the video projector; free discussions; | 12 hours |
| Test | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| | | |

Bibliography


- Behrouz Forouzan, *Foundation of Computer science*, forth edition, Cencage Learning, EMEA, 2020
- Behrouz Forouzan, *Foundation of Computer science*, third edition, Cencage Learning, EMEA, 2014
- Dorian Gorgan, Gheorghe Sebestyen, *Structura Calculatoarelor*, Ed. Albastra, Cluj-Napoca, 2000
- Grigore Albeanu, *Sisteme De Operare*, Editura Petrion, Bucureşti, 1996
- Radu Mârşanu, *Sisteme De Calcul*, Editura Teora, Bucureşti, 1996
- Emanuela Cerchez, Marinel Şerban, *Sisteme De Calcul,* Bucureşti 1998
- J. Glenn Brookshear, *Introducere În Informatica,* Editura Teora, Bucureşti 1998
- Microsoft Corporation, *Microsoft Office*
- Mirela Pater, *Introducere În Ştiinţa Calculatoarelor,* Editura Universităţii Din Oradea, Oradea, 2001
- Mirela Pater, *Introducere În Ştiinţa Sistemelor De Calcul,* Editura Universităţii Din Oradea, Oradea, ISBN 978-973-759-494-5, 266 pag., 2008
- Mirela Pater, *Introducere În Ştiinţa Sistemelor De Calcul,* format electronic, 2013

https://uoradea-my.sharepoint.com/personal/alexandrina_pater_didactic_uoradea_ro/Documents/ISSC%20editie%20electronica%202013.pdf


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

The content of the discipline contributes to the acquisition of the principles of the elaboration of the programs for the parallel calculation.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the | Written paper<br>The evaluation can be done face to face or online | 50% |

| | | | |
|---|---|---|---|
| | minimum performance standard<br>For 10: KnowledgeUnderstanding | | |
| 10.5 Academic seminar | - | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10:Knowledge and understanding;Ability to explain and interpret;Complete and correct solution of the requirements. | - Laboratory / practical works<br>-Tests during the semester<br>The evaluation can be done face to face or online | 50% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course:<br>1.To solve well a minimum of topics -questions and applications<br>2.Minimum grade 5 in the laboratory<br>Academic seminar:-<br>Laboratory:<br>1.The student knows the main concepts, recognizes them, defines them correctly and builds a simple application;<br>2. The programming language is used correctly;<br>3.To solve well a minimum of topics -questions and applications<br>Project:- | | | |

**Completion date: 5.09.2022**

**Date of endorsement in the department:21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**

**SUBJECT DESCRIPTION**

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | **Computer Programming and Programming Languages II** | | | | | | |
| 2.2 Holder of the subject | s.l.dr.ing. Simina COMAN | | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | s.l.dr.ing. Simina COMAN | | | | | | |
| 2.4 Year of study | **I** | 2.5 Semester | **II** | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **FD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **2** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 23 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 15 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 23 |
| Tutorials | 2 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | **5** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | C language programming skills |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - classroom equipped with computer and video projector - presentation based on slides<br>- attendance of at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | -laboratory room equipped with computers, C / C ++ (Visual Studio / DevC ++ / MinGW)<br>- mandatory presence at all laboratories; |

| | |
|---|---|
| | - a maximum of 4 works can be recovered during the semester (30%);<br>- the frequency of laboratory hours below 70% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | **CP1**. Operating with scientific, engineering, and informational fundaments<br><br>**CP3.** Solving problems using computer science and engineering instruments |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Continuing the programming elements started in the previous semester, the course aims to familiarize students with a series of advanced programming techniques and concepts that allow the design and development of programs with a high degree of complexity.<br>▪ The course has a strong applicative character, in order to deepen the practical programming skills of students, containing a large number of examples of algorithms in source format, but without restricting the generality of the concepts presented. |
| 7.2 Specific objectives | ▪ The course aims to present advanced programming techniques and concepts together with specific methods and algorithms, which allow the design and implementation of complex programs, in order to solve different types of applications: advanced manipulation of arrays, files, strings, along with a series of algorithms known in the field. A separate chapter addresses, for example, the issue of recursion. Are also presented fundamental notions of evaluating the performance of algorithms, exemplified by comparative evaluations as well as the design and implementation of complex programs.<br>▪ The laboratory, made using C ++ language, familiarizes students with practical aspects of solving different types of problems by implementing and adapting specific algorithms and data types<br>▪ |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introduction<br>1.1. Data types and structures<br>1.1.1. Static data types<br>1.1.2. Dynamic data types<br>1.2. Evaluation of algorithm performance - concepts used, notation O (n) | Free exposure, with the presentation of the course on the video projector and on the board | 2h |
| 2. Strings<br>2.1. Generalities.<br>2.2. Functions<br>2.3 String search techniques<br>2.3.1Direct Search | Free exposure, with the presentation of the course on the video | 2h |

| | | |
|---|---|---|
| 2.3.2 The Boyer-Moore Search | projector and on the board | |
| 3 Search and Sort Algorithms for Static Data Structures<br>3.1. Search algorithms in arrays<br>3.1.1. The flag technique<br>3.1.2. Binary search<br>3.1.3 High-performance binary search<br>3.1.4 Search by interpolation<br>3.2. Algorithms for sorting arrays<br>3.2.1. Direct sorting methods<br>3.2.1.1. Insertion sorting technique<br>3.2.1.2. Selection sorting technique<br>3.2.1.3. Interchange sorting technique<br>3.2.2. Advanced sorting methods<br>3.2.2.1. Insertion sorting technique with decreasing increment (Shellsort)<br>3.2.2.2. The technique of sorting trees by Heapsort method<br>3.2.2.3. Quicksort sorting technique<br>3.2.3. Sorting sequential files (external sorting)<br>3.2.3.1. Interclass sorting technique<br>3.2.3.2. The technique of sorting by natural interclassing | Free exposure, with the presentation of the course on the video projector and on the board | 2h<br><br><br><br><br><br><br><br>2h<br><br><br><br><br><br><br>2h<br><br><br>2h |
| 4. Recursive Algorithms<br>4.1. Generalities.<br>4.2. Recursive algorithms. Examples<br>4.2.1. Division algorithms<br>4.2.2. Recursive algorithms for determination of all solutions to a problem<br>4.2.3. Backtracking algorithms<br>4.2.4. Algorithms for determination of optimum (knapsack problem) | Free exposure, with the presentation of the course on the video projector and on the board | 2h<br><br><br>2h<br><br><br><br>2h |
| 5. List Data Structure<br>5.1 List implementation techniques<br>5.1.1. Implementing lists using the table type<br>5.1.2. Implementing lists using the pointer type<br>5.1.2.1. Creating chained lists. Insert a node in a chained list<br>5.1.2.2. Delete nodes from a chained list<br>5.1.2.3. Crossing a chained list<br>5.1.3. Comparison between the methods of implementing the lists based on the array type and on the pointer type<br>5.2. Variants of the list structure<br>5.2.1. Ordered lists. Using the flag technique in the list structure. Reorder list search<br>5.2.2.Double-stranded lists<br>5.2.3. Stacks<br>5.2.4. Queues | Free exposure, with the presentation of the course on the video projector and on the board | 2h<br><br><br><br>2h<br><br><br><br>2h<br><br><br><br>2h |
| 6. Dispersion Technique<br>6.1. The principle of dispersion technique<br>6.2. Determination of dispersion function. Treating the collision situation | Free exposure, with the presentation of the course on the video projector and on the board | 2h |
| | | |
| Bibliography<br>1. http://www.cprogramming.com/ | | |

2. http://www.algolist.net/Algorithms/

3. P.J.Deitel, H.M. Deitel, *C: How to program*, Pearson Education International, ISBN 0-13-239300-X, Fifth Edition, 2007

4. D. Knuth, *Arta programarii calculatoarelor*, volumul 3 - Sortare si cautare, Editura Teora, 2004

5. D. Zmaranda - *Algoritmi şi tehnici de programare*, Editura Universităţii din Oradea, ISBN 973-613-062-2, 264 pg., 2001, versiune electronică actualizată 2014, https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/Documents/PCLPIII/PCLP_III.pdf https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/Documents/SDD/Structuri_de_date.pdf

6.V. Creţu, *Structuri de date şi algoritmi – vol. 1: Structuri de date fundamentale*, Editura Orizonturi Universitare Timisoara, ISBN 973-9400-74-4, 2000

| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Determining the execution time of a program | Students receive lab themes at least a week in advance, and study them (problems at the end of the lab). At the beginning of the laboratory, the ways of solving the proposed applications are discussed. Then, the students carry out the practical part of the paper (the proposed problems) under the guidance of the teacher. | 2 h |
| 2. Search techniques in arrays | | 2 h |
| 3. Data type string. Functions. Character search techniques | | 2 h |
| 4. Direct sorting techniques of arrays | | 2 h |
| 5. Advanced array sorting techniques | | 2 h |
| 6. Sorting sequential files | | 2 h |
| 7. Recursion - recursive algorithms | | 2 h |
| 8. Recursion - backtracking | | 2 h |
| 9. List data structure | | 2 h |
| 10. Ordered lists. Using the flag technique in the list structure. Double chained lists | | 2 h |
| 11. Stacks and tails | | 2 h |
| 12. Dispersion technique | | 2 h |
| 13. Handing over the works, concluding the situation at the laboratory | | 2 h |
| 14. Recovery | | 2 h |
| | | |

Bibliography

1. Doina Zmaranda, Marius Bonaciu, Coman Simina - - *Algoritmi şi tehnici de programare* – îndrumător de laborator, volumul I , Editura Universităţii din Oradea, Editie revizuita, ISBN: 978-606-10-1895-6, 90 pg., versiune electronica, 2017

2. D. Zmaranda, Bonaciu Marius - *Algoritmi şi tehnici de programare* – îndrumător de laborator, volumul I , Editura Universităţii din Oradea, ISBN 973-613-302-8, 100 pg., 2003, versiune electronică actualizată 2014, https://uoradea-my.sharepoint.com/personal/rodica_zmaranda_didactic_uoradea_ro/Documents/PCLPIII/Laborator_PCLPIII.pdf

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer specialization of other university centers that have accredited these specializations ("Polytechnic" University of Timisoara, Bucharest Polytechnic); knowledge of data types and algorithms presented in this discipline is a fundamental requirement in the purpose of training the necessary basic programming skills and abilities

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>- For 10: the correct answer is required for all topics in the grid | Written exam<br>Students each receive a form with 18 theory topics, grid type | 50% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>- For 10: detailed knowledge of how to implement all laboratory work | Practical application<br>At each laboratory, students are evaluated based on the activity (answers to questions, implementation proposals, etc.), evaluations that materialize at the end of the laboratory in a note on the laboratory activity during the semester.<br>Also, in the last hour of the laboratory, the students complete and handle to the teacher all the practical applications proposed in the laboratory. The average between the grade received for the practical applications and the grade from the laboratory activity will represent the final grade at the laboratory | 50% |
| 10.7 Project | | | |

10.8 Minimum performance standard:
Course: Acquiring knowledge of: the performance of an algorithm, array search techniques, recursion, list data structures
Academic seminar:
Laboratory:
• knowledge of the way of analytical evaluation of the performances of an algorithm, comparative evaluation of the performances of simple algorithms
• Understanding the programming techniques used in array search methods as well as direct and advanced sorting methods of arrays and files and applying search and sorting methods in various program categories
• Understanding the mechanism of recursion, familiarization with the main types of recursive algorithms and application of various types of recursive algorithms in specific applications; handling of self-

referenced structures (lists)
• advanced knowledge of how to manipulate strings and specific string search algorithms
Project:

**Completion date:** 16.09.2022

**Date of endorsement in the department:** 21.09.2022

**Date of endorsement in the Faculty Board:** 23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and information technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Information Technology / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Applied informatics II** | | | | | |
| 2.2 Holder of the subject | | Associate professor dr. Elisa Valentina MOISI | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Associate professor dr. Elisa Valentina MOISI | | | | | |
| 2.4 Year of study | I | 2.5 Semester | 2 | 2.6 Type of the evaluation | Vp - Continuous Assessment | 2.7 Subject regime | FD - Field Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 2 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 28 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 27 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 28 |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | 5 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | Programming logics, average language programming skills |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom with laptops and video projector<br>The course can be held face-to-face or online. |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory room equipped with networked computers, internet connection and adequate software<br>The laboratory can be carried out face to face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | CP1. Operating with scientific, engineering and informational fundaments<br>CP3. Solving problems using computer science and engineering instruments |
| Transversal skills | CT1. Honorable, responsible and ethical behavior, respecting the spirit of the law, to ensure the reputation of the profession.<br>CT2. Identification, description and implementation of project management processes, by taking different team roles, together with a clear and concise verbal and written description, in Romanian and an international language , of the results of the activity<br>CT3. Demonstration of initiative and action for updating professional, economic knowledge and organizational culture. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Formation of algorithm design skills in parallel with demonstrating their correctness<br>▪ Training in the design of the correct programs from the specifications<br>▪ Forming a modern style of programming<br>▪ Development of software components using data structures, algorithms, techniques, and evolved programming languages |
| 7.2 Specific objectives | ▪ Students will learn core programming basics—including data types, control structures, algorithm development, and program design with functions—via the Python programming language.<br>▪ Students will learn the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques.<br>▪ Students will problem solve, explore real-world software development challenges, and create practical and contemporary applications using graphical user interfaces and graphics. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Introduction to Computers and Programming | Presentation, description, explanations, examples, dialogue | 2 |
| Software Development, Data Types, and Expressions | | 2 |
| Decision and Repetition Structures | | 2 |
| Design with Functions. Recursion | | 2 |
| Files and Exceptions | | 2 |
| List and Tuples | | 2 |
| Strings | | 2 |
| Dictionaries and Sets | | 2 |
| Design with Classes | | 2 |
| Inheritance | | 2 |
| GUI Programming | | 2 |
| Simple Graphics | | 2 |
| Pythonic programming | | 2 |
| Summary and final discussions | | 2 |

Bibliography


1. Starting Out with Python, 4/E, Tony Gaddis, Haywood Community College, published by Pearson Education © 2018, ISBN 978-0-13-444432-1
2. Fundamentals of Python: First Programs, 2nd Edition, Author: Kenneth Lambert, Publisher: Cengage Learning, 2018, ISBN-13: 978-1-337-56009-2


| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|

| | | |
|---|---|---|
| 1-14. Practical aspects based on the topics discussed in the course | Participatory laboratory, students writing code, group work, dialogue, demonstration, questions, functionality testing | 28 |

Bibliography


1. Starting Out with Python, 4/E, Tony Gaddis, Haywood Community College, published by Pearson Education © 2018, ISBN 978-0-13-444432-1
2. Fundamentals of Python: First Programs, 2nd Edition, Author: Kenneth Lambert, Publisher: Cengage Learning, 2018, ISBN-13: 978-1-337-56009-2


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is consistent with what is done in other university centers abroad.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard | Written paper | 50% |
| 10.5 Academic seminar | | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard | - Laboratory / practical works<br>- final test | 50% |
| 10.7 Project | | | |

10.8 Minimum performance standard:

Course:

1. To solve well a minimum of topics -questions and applications
2. Minimum grade 5 in the laboratory

Academic seminar: -

Laboratory:

1. The student knows the main concepts, recognizes them, defines them correctly and builds a simple application;
2. The programming language is used correctly;
3. To solve well a minimum of topics -questions and applications

Project: -

**Completion date: 07.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | *Computers and Information Technology* |
| 1.4 Field of study | *Computers and Information Technology* |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | *Information Technology* / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | *Security of systems and applications* | | | | | |
| 2.2 Holder of the subject | | **Prof.dr.habil.eng. Daniela Elena Popescu** | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **Prof.dr.habil.eng. Daniela Elena Popescu** | | | | | |
| 2.4 Year of study **III** | | 2.5 Semester **6** | | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **DS** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **1/1** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | **14** |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| 3.7 Total of hours for individual study | **56** |
| 3.9 Total of hours per semester | **112** |
| 3.10 Number of credits | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions)<br>Operating Systems |
| 4.2 related to skills | Computer Systems Architecture |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - The course can be held face to face or online "<br>- attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | - The seminar / laboratory / project can be held face to face or online<br>- Mandatory presence at all laboratories;<br>- Students must have completed the theoretical part of the paper;<br>- A maximum of 4 works can be recovered during the semester (30%); |

| | |
|---|---|
| | - The frequency at laboratory hours below 70% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | CP3. Problem solving using Computer Science and engineering tools<br><br>CP5. Design, life cycle management, integration and integrity of hardware, software and communications systems in order to increase the security of systems |
| Transversal skills | CT1. Applying, in the context of compliance with the law, intellectual property rights (including technology transfer), product certification methodology, principles, norms and values of the code of professional ethics within its own rigorous, efficient and responsible work strategy<br>• Defining the basic managerial concepts necessary to implement a high security operating environment at the level of organizations<br>• Development and implementation of process models of private cloud management.<br>• Scientific substantiation of management decisions regarding the preservation and increase of process security as well as the implementation and monitoring of their effects within the organization<br><br>CT2. Identify roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team<br>• Assuming the specific roles and responsibilities of leading teams engaged in development activities for high security infrastructures / systems<br>• Increasing the interest for the correct realization of a scientific research and for the pursuit of a career in research. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Familiarizing students with the defining elements for implementing and increasing the level of information security at the organizational level as well as identifying healthy strategies for institutional development in this regard |
| 7.2 Specific objectives | • The course aims to familiarize with information security issues, with what data vulnerabilities represent, with the way in which the issue of protection of both unconnected and networked systems is raised. It aims to present the basic characteristics of information security issues and to develop the capabilities to develop the security policy as a whole in order to protect the information.<br>• The laboratories are oriented towards the presentation in the first phase of the Security problems at the level of computer systems, after which the emphasis falls on the development of skills to use useful tools for scanning and identifying vulnerabilities, on the presentation of stages and how penetration tests are performed. of systems, as well as the protections that can be taken in this respect |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Information processing security, protection of values, Characteristics of computer intrusion, Attacks, Significance of computer security, Security purposes, Privacy, Integrity, Availability, Vulnerabilities - hardware, software, Data vulnerabilities, Computer offenders, Methods Defense, Controls, The Future in the Field<br>2. Protection of non-networked computers, User authentication, Password systems, Advantages of password systems, Disadvantage, Rules to increase | Free course presentation with video projector / overhead projector and blackboard in an interactive way: punctuate from time to time questions for students in order to increase the degree of interactivity | 28 ore |

| | | |
|---|---|---|
| the security provided by the password system, Encryption protection, Authentication based on encrypted keys, Authentication based on what the user is, Biometric authentication systems, Use of fingerprints in authentication<br>1. Access control: • Identification • Authentication Three factors • Single login • Single conviction • Access control with subjects and objects • Access control mode (DAC, non-DAC, MAC and RBAC) • Bell-LaPadula, Biba, Clark -Wilson, and Chinese Wall architecture • Identity management • Cloud computing<br>2. Advanced communication and network elements: Open Systems Interconnection (OSI) and Transmission Control Protocol / Internet Protocol (TCP / IP) models • Bus, star and token ring network configurations • Common protocols in TCP / IP suite • Ports used with common protocols • Different network architectures such as Internet, intranet, and extranet • Demilitarized zones (DMZ) • Wireless security protocols such as Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA) and WPA2 • Wireless technologies such as Bluetooth, RFID, 802.11, WiMax, GSM, 3G and NFC<br>3. Communication and network elements: • Telecommunication methods used to access the Internet • Securing the Voice over Internet Protocol (VoIP) with Secure Real-Time • Transport Protocol (SRTP) • Filtering packets, firewalls and firewalls application • Protects diversity with firewalls • Differentiates between network and host based firewalls • Risks and vulnerabilities related to remote access solutions • Different tunneling protocols using remote access • Authentication methods using remote access • Control network access<br>4. Differences between hackers and crackers • Differences between whitehats, blackhats, and grayhats • Denial-of-service and distributed denial-ofservice attacks • Zero-day exploits • Threats Advanced Persistence • Social Engineering Tactics • The Importance of Tools to Reduce Social Engineering Attacks<br>5. Code and Malware: Different types of viruses • Differences between viruses, worms, Trojans and logic bombs • Sets of roots, hatches, back doors and spyware • Differences between signature-based detection and heuristic-based detection • for antivirus software • The importance of keeping antivirus signature definitions up to date • Using spam filters and content filtering devices • The principle of least privilege and how it can help prevent infections • Educating users about practices<br>6. Malicious code and activity: • Different types of viruses • Differences between viruses, worms, Trojans and logic bombs • Root sets, hatches, backdoors and spyware • Differences between signature-based detection and detection-based of antivirus heuristics • The importance of keeping antivirus signature definitions up to date • Using spam filters and content filtering devices • The least privilege principle and how it can help prevent infections • Educating users about safe computer practices • Common vulnerabilities and exposures | • Indication of topics for documentation and individual study | |

| | | |
|---|---|---|
| 7. Risk, responses and recovery: • Definition of risk, threats, vulnerabilities and impact • Four main methods of risk management: mitigation (mitigation), avoidance, transfer and acceptance • Definition of residual risk • Steps used in risk assessment • Differences between analyzes quantitative and qualitative • Steps in response to the incident: preparation, detection, analysis, retention, eradication, • recovery and post-incident activities<br>8. Monitoring and analysis: • Security alert and false positive • Network-based and host-based intrusion detection systems • Intrusion prevention systems • Method of detection and prevention of attacks • File integration verifiers • Honeypots, plas honeycomb and lined cells • Event And Incident Managers, such as SIMs, System Event Managers (SEMs) and SIEMs • Types of vulnerability assessment tests • Tools | | |
| | | |

Bibliography


1. Notite de curs (slide-uri) puse la dispozitie studentilor in format electronic pe platforma Office 365
2. Stallings W, Cryptography and Network Security Principles and Practice, Thhird Edition, Prentice Hall, 2003,
3. D.E.Popescu, Managementul securitatii informatiei, Editura Universitatii din Oradea, 2012
4. Computer Hacking, Security testing, Penetration testing and basic Security, Author: Cary hall & Erin Watson, Kindle edition, free, https://www.amazon.com/Hacking-Computer-Security-Testing-Penetration-ebook/dp/B01N1UPX8D
5. ITIL
1. 6 https://portswigger.net


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Presentation of laboratory activities, laboratories, labor protection rules and conventional signs specific to the field of information systems - general, general information on data protection and monitoring<br>2. Anonymity and Privacy, Darknet, darkweb<br>4. Network scanning tools and vulnerability scanning tools<br>5. Using NMAP for port scanning and vulnerability scanning (or Nessus alternative)<br>6-7. Use of Metaspoit facilities<br>8 SetUid programs<br>9-13 Using the Portswigger platform for exploiting web application vulnerabilities<br>14. Teaching laboratory works with knowledge verification | Students receive laboratory papers at least one week in advance, study them, inspect them, and take a theoretical test at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher. | 2 hours are allocated for each of the 14 detailed points of the laboratory activity. |

Bibliography


1. D.E.Popescu, Managementul securitatii informatiei, Editura Universitatii din Oradea, 2012
2. Modulul Moodle cu lucrarile de laborator
3. Webografie recomandata in cadrul orelor de proiect
4. Platforma Portswigger - https://portswigger.net
5. Metasploit: The Penetration Tester's Guide, Authors: David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni, https://www.amazon.com/Metasploit-Penetration-Testers-David-Kennedy/dp/159327288X


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer and Information Technology specializations and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of

| |
|---|
| Iasi, etc. ), and knowledge of the architecture and organization of computer systems as well as their operation and design is a stringent requirement of employers in the field (Rds & Rcs, Plexus, Neologic, Celestica, Keysys, etc.). |

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5) in accordance with the minimum performance standard:<br>- it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br><br>For 10:<br>- for grade 10, a thorough knowledge of all is required | The evaluation can be done face to face or online depending on the situation imposed | 70% |
| 10.6 Laboratory | - for mark 5 it is necessary to solve the corresponding number of requirements, depending on the test scale.<br><br>- for mark 10, all requirements on the test sheet must be correctly resolved. | Tests during the semester<br>The evaluation of students is done through two tests, taken during the semester. The arithmetic mean of the marks of these tests represents the mark with which they enter the exam. Students can also get extra points, depending on their participation in the laboratory and solving exercises with a higher degree of difficulty. These points can be used to calculate the test score. | 30% |
| 10.8 Minimum performance standard:<br>Assimilation of detailed knowledge about vulnerabilities, risks and security solutions in managing and conveying information in a company<br>The timely solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level.<br>• Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, own research related to learning (library, internet), cultivating a work discipline, done correctly and time | | | |

**Completion date:**
08.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Mobile and web applications design** | | | | |
| 2.2 Holder of the subject | | | Prof. dr. ing. Gyorodi Robert Stefan | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | Sef. Lucr. Dr. Ing. Pecherle George Dominic | | | | |
| 2.4 Year of study | III | 2.5 Semester | 2 | 2.6 Type of the evaluation | Vp | 2.7 Subject regime | SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 7 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 4 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 4 |
| Tutorials | 2 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **19** |
| **3.9 Total of hours per semester** | **75** |
| **3.10 Number of credits** | 3 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions)<br>Computer programming and programming languages I |
| 4.2 related to skills | Structured programming in the C language/ C ++ / Java object-oriented |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer.<br>The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with video projector and computers that are connected to the internet. They have installed XAMPP, Visual Studio 2019, Android Studio 4.2, Eclipse with Java EE, Android SDK & NDK, |

| | |
|---|---|
| | Windows SDK, mac OS 11 with XCode 12.2 and iOS SDK, Node.js. The laboratory can take place face to face or online |
| **6. Specific skills acquired** | |
| Professional skills | C5. Designing, lifecycle management, integration and integrity of hardware, software and communication systems<br>C6. Designing intelligent systems |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The course contributes to the acquisition of practical and design skills in the use of technologies for the design of mobile applications for current devices. |
| 7.2 Specific objectives | ▪ This course is designed to develop both practical skills and understanding of current mobile technologies: architectures of mobile devices and mobile operating systems, design of user interfaces for mobile devices, mobile websites, client-side programming, including Ajax. Use of technologies such as ASP.NET, Node.js, respectively those based on Java, acquiring the concepts underlying the development and use of web services, application development concepts for the main families of mobile devices: Android, iOS, Windows, using a unitary framework for the development of multi-platform applications. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Introduction, native mobile applications or hybrid apps | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| 2. Concepts of hybrid cross-platform application development Angular, React / Native, Ionic | | 2 hours |
| 3. Techniques for developing hybrid applications - Ionic, Angular | | 2 hours |
| 4. Techniques for developing hybrid applications - Ionic, React Native | | 2 hours |
| 5. Architectures of mobile devices and mobile operating systems | | 2 hours |
| 6. Principles of application development for the Android platform | | 6 hours |
| 7. Advanced concepts for Android platform application development | | 10 hours |
| 8. The future evolution of technologies for mobile and web devices | | 2 hours |

Bibliography


1. Professional Mobile Application Development, Jeff McWherter, Scott Gowell, John Wiley & Sons, 2012, ISBN 978-1-118-20390-3
2. Android Cookbook, 2nd Ed., Ian F. Darwin, O'Reilly, 2017, ISBN 978-1449374433
3. Android Apps Security, Sheran Gunasekera, APress, 2012, ISBN 978-1-4302-4062-4

4. Android Database Programming, Jason Wei, Packt Publishing, 2012, ISBN 978-1-84951-812-3
5. Android Application Testing Guide, Diego Torres Milano, Packt Publishing, 2011, ISBN 978-1-849513-50-0
6. Android UI Fundamentals: Develop and Design, Jason Ostrander, Peachpit Press, 2012, ISBN 978-0-321-81458-6
7. Beginning iOS Storyboarding with Xcode, Rory Lewis, Yulia McCarthy și Stephen M. Moraco, APress, 2012, ISBN 978-1-4302-4272-7
8. UX Strategy: How to Devise Innovative Digital Products that People Want, Jaime Levy, O'Reilly Media, 2015, ISBN 9781449372866
9. Designing Multi-Device Experiences: An Ecosystem Approach to User Experiences across Devices, Michal Levin, O'Reilly Media, 2014, ISBN 9781449340384
10. Mobile Design Pattern Gallery: UI Patterns for Smartphone Apps, 2nd Ed, Theresa Neil, O'Reilly Media, 2014, ISBN 9781449363635
11. Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development, 2nd Ed., Fu Cheng, Apress, 2018, ISBN 978-1484237748
12. Ionic Cookbook, 3rd Ed., Indermohan Singh,Hoc Phan, Packt Publishing, 2018, ISBN 9781788623230
13. Mastering Android Application Development, Antonio Pachon Ruiz, Packt Publishing, 2015, ISBN 9781785884221
14. Android Studio 4.1 Development Essentials - Java Edition, Neil Smyth, Payload Media, Inc., 2020, ISBN 9781951442255
15. Android Programming for Beginners, 2nd Ed., John Horton, Packt Publishing, 2018, ISBN 9781789538502
16. Android Security Internals, Nikolay Elenkov, No Starch Press, 2014, ISBN 9781593275815
17. Android 9 Development Cookbook, 3rd Ed., Rick Boyer, Packt Publishing, 2018, ISBN 9781788991216
18. Head First iPhone & iPad Development, 3rd Ed, Tracey Pilone & Dan Pilone, O'Reilly Media, 2013, ISBN 9781449316570
19. iOS 14 Programming Fundamentals with Swift, Matt Neuburg, O'Reilly Media, 2020, ISBN 9781492092094
20. Programming iOS 14, Matt Neuburg, O'Reilly Media, 2020, ISBN 9781492092179
21. Real World Windows 10 Development, 2nd Ed, Edward Moemeka & Elizabeth Moemeka, Apress, 2016, ISBN 9781484214497
22. Mastering Xamarin.Forms, 3rd Ed., Ed Snider, Packt Publishing, 2019, ISBN 9781839213380
23. https://e.uoradea.ro/course/view.php?id=6139 Materials (courses and laboratories)

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. JavaScript / TypeScript, CSS, HTML5 - advanced concepts | Powerpoint presentation with the help of the video projector/Oral presentation.<br><br>The students are assessed by a practical test using computer from laboratory topics. | 2 hours |
| 2. Creating web services that can be consumed from mobile devices.<br>- ASP.NET<br>- Node.js<br>- Java | | 2 hours |
| 3. Multi-platform application development | | 4 hours |
| 4. Development of applications for the Android platform | | 4 hours |
| 5. Development of a solution for Android and / or multi-platform | | 14 hours |
| 6. Final test | | 2 hours |

Bibliography

1. Android Apps Security, Sheran Gunasekera, APress, 2012, ISBN 978-1-4302-4062-4
2. Android Database Programming, Jason Wei, Packt Publishing, 2012, ISBN 978-1-84951-812-3
3. Android Application Testing Guide, Diego Torres Milano, Packt Publishing, 2011, ISBN 978-1-849513-50-0
4. Android UI Fundamentals: Develop and Design, Jason Ostrander, Peachpit Press, 2012, ISBN 978-0-321-81458-6
5. Beginning iOS Storyboarding with Xcode, Rory Lewis, Yulia McCarthy și Stephen M. Moraco, APress, 2012, ISBN 978-1-4302-4272-7

6. UX Strategy: How to Devise Innovative Digital Products that People Want, Jaime Levy, O'Reilly Media, 2015, ISBN 9781449372866
7. Designing Multi-Device Experiences: An Ecosystem Approach to User Experiences across Devices, Michal Levin, O'Reilly Media, 2014, ISBN 9781449340384
8. Mobile Design Pattern Gallery: UI Patterns for Smartphone Apps, 2nd Ed, Theresa Neil, O'Reilly Media, 2014, ISBN 9781449363635
9. Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development, 2nd Ed., Fu Cheng, Apress, 2018, ISBN 978-1484237748
10. Ionic Cookbook, 3rd Ed., Indermohan Singh,Hoc Phan, Packt Publishing, 2018, ISBN 9781788623230
11. Mastering Android Application Development, Antonio Pachon Ruiz, Packt Publishing, 2015, ISBN 9781785884221
12. Android Studio 4.1 Development Essentials - Java Edition, Neil Smyth, Payload Media, Inc., 2020, ISBN 9781951442255
13. Android Programming for Beginners, 2nd Ed., John Horton, Packt Publishing, 2018, ISBN 9781789538502
14. Android Security Internals, Nikolay Elenkov, No Starch Press, 2014, ISBN 9781593275815
15. Android 9 Development Cookbook, 3rd Ed., Rick Boyer, Packt Publishing, 2018, ISBN 9781788991216
16. Head First iPhone & iPad Development, 3rd Ed, Tracey Pilone & Dan Pilone, O'Reilly Media, 2013, ISBN 9781449316570
17. iOS 14 Programming Fundamentals with Swift, Matt Neuburg, O'Reilly Media, 2020, ISBN 9781492092094
18. Programming iOS 14, Matt Neuburg, O'Reilly Media, 2020, ISBN 9781492092179
19. Real World Windows 10 Development, 2nd Ed, Edward Moemeka & Elizabeth Moemeka, Apress, 2016, ISBN 9781484214497
20. Mastering Xamarin.Forms, 3rd Ed., Ed Snider, Packt Publishing, 2019, ISBN 9781839213380
21. https://e.uoradea.ro/course/view.php?id=6139 Materials (courses and laboratories)

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline corresponds to the requirements necessary for the design and implementation of applications for mobile and web devices.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved<br>- For 10: 100% of the subjects from the final exam should be correctly solved | Semester exam – written<br><br>Two Assessments during the semester from the course and laboratory subjects. | 50% |
| 10.5 Academic seminar | - | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion | Oral/written | 50% |

| | | | |
|---|---|---|---|
| | (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Evaluation of applications and interpretation of results | |
| 10.7 Project | - | - | - |
| 10.8 Minimum performance standard:<br>Course: 50% of the maximum score of the cumulate assessments<br>Academic seminar:<br>Laboratory: 50% of the maximum score of the laboratory evaluations<br>Project: | | | |

| | Course instructor | Head of department |
|---|---|---|
| **Completion date:**<br>07.09.2022 | prof. dr. ing. Győrödi Robert<br>E-mail: rgyorodi@uoradea.ro | conf. dr. ing. Pater Mirela |

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | Input / Output Systems and Data Transmission | | | | |
| 2.2 Holder of the subject | | | Șef lucrări.dr.ing. Mihăilă Ioan Mircea | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | Șef lucrări.dr.ing. Mihăilă Ioan Mircea | | | | |
| 2.4 Year of study | III | 2.5 Semester | II | 2.6 Type of the evaluation | EX | 2.7 Subject regime | FD |

FD – Field Discipline

**3. Total estimated time (hours of didactic activities per semester)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3.1 Number of hours per week | 5 | of which: 3.2 course | 2 | 3.3 project | 1 | 3.4 laboratory | 2 |
| 3.5 Total of hours from the curriculum | 70 | of which: 3.6 course | 28 | 3.7 project | 14 | 3.8 laboratory | 28 |

| | |
|---|---|
| Distribution of time | 70 |
| Study using the manual, course support, bibliography and handwritten notes | 42 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | | | |
|---|---|---|---|
| 3.9 Total of hours for individual study | **70** | | |
| 3.10 Total of hours per semester | **140** | | |
| 3.11 Number of credits | **5** | | |

**4. Pre-requisites (where applicable)**

| | |
|---|---|
| 4.1 related to the curriculum | Computers architecture. Systems with microprocessors. Networking. |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer. The course can be held face to face or online. |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that are connected to the Internet and dedicated software installed.<br>The laboratory / project can be held face to face or online |

| 6. Competenţele specifice acumulate | |
|---|---|
| Professional skills | CP1. Operating with scientific, engineering and informational fundaments<br>CP3. Solving problems using computer science and engineering instruments<br>CP2. Hardware, software, telecommunication |
| Transversal skills | CT2. Identifying, describing and carrying out the processes in project management, taking over the different roles in the team and clearly and concisely describing, verbally and in writing, the results in the field of activity. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The course aims to present to the students how are designed and how work the Input / Output systems |
| 7.2 Specific objectives | • The course and the laboratory aim to introduce and familiarize students with problems related to the input-output system of a computer, the interface with peripheral equipment and the operating principles of peripheral equipment, presenting modern technologies, implementation, examples and applications |

**8. Contents**

| 8.1 Course | Teaching methods | No. of hours / observations |
|---|---|---|
| Introduction<br>General data regarding the I / O system. I / O systems. I / O modules | Oral presentation using the video projector, debates, questions and answers. | 2 hours |
| Data transfer methods<br>Scheduled transfer. Reading data. Writing data.<br>I / O commands. I / O instructions<br>Interrupt transfer<br>Direct memory access (DMA) transfer | | 2 hours |
| Buses<br>The concept of bus. Defining elements<br>Classification of buses by working mode<br>Classification of buses by number of connected master modules<br>Classification of buses according to the way of data transfer<br>Classification of buses according to the number of signals used in data transfer<br>PCI bus<br>PCIe bus<br>USB bus | | 8 hours |
| Video peripherals<br>General presentation. Types of displays.<br>Features and performance.<br>Video adapter. Graphic controller. Video BIOS system. Video memory | | 6 hours |

| | | |
|---|---|---|
| Liquid crystal displays<br>OLED displays | | |
| Data magnetic recording<br>General presentation. The structure of a hard disk<br>Principles of data magnetic recording<br>Organizing data on the hard disk.<br>Interface | | 2 hours |
| Data storage on optical discs. CD. DVD. Blu-Ray | | 2 hours |
| Printing technologies<br>Printers classification. Printer's general structure<br>Dot matrix printer. Inkjet printers. Laser printer<br>Color printer | | 4 hours |
| Remote data transmission.<br>Network card (RJ45 connection, Wi-Fi wireless connection)<br>Router<br>Components of a computer network. | | 2 hours |
| Bibliography:<br><br>E. Vladu "Interfeţe şi echipamente periferice" , Ed. Univ. din Oradea 2002;<br>James W. Coffron, Wiliam E. "Long Practical Interfacing Techniques for Microprocessor" 2000,<br>Prentice Hall Inc.; Andrew Tanenbaum,<br>Organizarea structurata a calculatoarelor, Computer Press Agora, Bucuresti, 1999.;<br>IBM PC/AT Tehnical Reference. IBM Personal Computer Hardware Reference Library 2005;<br>C. Strugaru -Calculatoare Sistemul de intrare-ieşire, Ed. Orizonturi universitare, Timişoara 2001<br>Baruch Zoltan – note de curs http://users.utcluj.ro/~baruch/ro/pages/cursuri/sisteme-de-intrareiesire/curs.php, 2015<br>Baruch Zoltan., Sisteme de intrare/ieşire, Îndrumător de lucrări de laborator, Editura U.T.PRES, Cluj-Napoca, 1998.<br>Petre Lucian Orgutan – Tehnici de Interfatare - Curs<br>WEB sources<br>https://en.wikipedia.org/wiki/Bus_(computing)<br>https://www.explainthatstuff.com/how-oleds-and-leps-work.html<br>https://ramonnastase.ro/blog/retele-de-calculatoare-ghid-complet-de-introducere-in-retele-de-calculatoare/<br>https://ro.wikipedia.org/wiki/Ruter<br>https://ro.wikipedia.org/wiki/Plac%C4%83_de_re%C8%9Bea | | |
| 8.2 Laboratory | Teaching methods | Observatios |
| Data transfer methods,<br>Parallel port,<br>Serial port,<br>USB interface<br>PC interrupts,<br>Magnetic and compact discs - interface solutions<br>Peripheral equipment - printers, monitors<br>Network card installation / configuration.<br>Router installation / configuration | PowerPoint presentation using the video projector<br>Students use a programming language to check how various interfaces work.<br>The programs are verified along the semester. | 2-4 hours are allocated for each laboratory activity |
| Final test | | |
| 8.3 Academic projects | Teaching methods | Observatios |
| Input / Output systems. Peripheral equipment. Data transmission, | Applications based on courses and laboratories | 14 hours |
| Bibliography<br>E. Vladu, C. Berce, "Interfeţe şi echipamente perfiferice. Aplicaţii.", Ed. Univ. din Oradea 2002;<br>Scott Mueller şi Craig Zacker "PC depanare şi modernizare" Editura Teora 2000<br>Jean Andrews- CompTIA A+ Guide to Hardware Managing, Maintaining and Troubleshooting 2014, Cengage Learning | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- 

The content of the discipline is found in the curriculum of Computer and Information Technology specializations from another Universities that have accredited these specializations, and knowledge related to I / O system and peripheral equipment, are elements of interest to employers.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.1 Course | For mark 5 it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br>For mark 10, a thorough knowledge of all subjects is required | Written paper<br>The evaluation can be done face to face or online | 50 % |
| 10.2 Laboratory | For mark 5: correct answer to at least 40% of the questions<br>For mark 10: correct answer to all questions | Laboratory / practical works<br>Tests during the semester<br>The evaluation can be done face to face or online | 20% |
| 10.3 Proiect | Oral presentation, followed by a practical demonstration.<br>For mark 6: completed project submitted in written form.<br>For mark 10: completed project submitted in written form, correct answer to all questions, functional practical demonstration. | The evaluation can be done face to face or online | 30% |
| 10.4 Minimum performance standard: | | | |
| Assimilation of detailed knowledge about interfacing peripherals in computer systems<br>In time solution for individual or in group activities, with qualified assistance.<br>Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, and learning (library, internet). | | | |

Date of filling in:
20.09.2022

Date of endorsement in the department
21.09.2022

Date of endorsement in the Faculty's Board
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Parallel and distributed algorithms** | | | | |
| 2.2 Holder of the subject | | | **Pecherle George Dominic** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **Pecherle George Dominic** | | | | |
| 2.4 Year of study | III | 2.5 Semester | 5 | 2.6 Type of the evaluation | Vp | 2.7 Subject regime | I |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 3 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/0 |
| 3.4 Total of hours from the curriculum | 42 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 10 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 10 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 5 |
| Tutorials | 5 |
| Examinations | 3 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **33** |
| **3.9 Total of hours per semester** | **75** |
| **3.10 Number of credits** | 3 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer. The course can be held face to face or online. |
| 5.2.for the development of the academic | Laboratory equipped with computers that are connected to the Internet and have installed the following programs: XAMPP, Sublime or Visual Studio |

| | |
|---|---|
| seminary/laboratory/project | Code. The seminar / laboratory / project can be held face to face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | C2. Design of hardware, software and communications components<br><br>C3. Problem solving using computer science and engineering tools<br><br>The course aims to present the principles of developing programs for parallel computing and studying parallel programming methods. |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The course aims to present the principles of developing programs for parallel computing and studying parallel programming methods. |
| 7.2 Specific objectives | The course aims to become familiar with the principles of developing programs for parallel computing and to study methods of parallel programming in the Java language. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Basic Java | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 2. Parallel programming in Java by example | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 3. Interfaces in Java | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 4. Exceptions and assertions | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 5. Generics in Java | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 6. Collections - part 1 | Powerpoint presentation with the help of the video projector; | 2 hours |

| | | |
|---|---|---|
| | free discussions; | |
| Chapter 7. Collections - part 2 | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 8. Sorting and searching algorithms in Java | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 9. String processing | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 10. Regular expressions | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 11. Parallel processing for input and output systems | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 12. JDBC - databases - part 1 | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 13. JDBC - databases - part 2 | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 14. Java Concurrency | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |

Bibliography


1. T. CORMEN, L. LEISERSON, R. RIVEST, *Introduction to Algorithms*, 2000
2. D. E. KNUTH, *The Art of Computer Programming*, Vol.1 and 3, Sorting and Searching, Addison-Wesley, Reading, Mass., 1973.
3. G. CIOBANU, Gh. PAUN, G. MAURI (Eds.). *Applications of Membrane Computing*, Springer 2005
4. M.J. QUINN. *Parallel Computing. Theory and Practice*, McGraw—Hill Series in Computer Science, 1994.
5. Gh. PAUN, *Membrane Computing. An Introduction*. Springer-Verlag, Berlin, 2002
6. Craus M., *Algoritmi pentru prelucrări paralele*, Editura "Gh.Asachi", Iași, 2002
7. Petcu D., Negru V., *Procesare distribuită*, Editura Universităţii de Vest, Seria Alef, Timişoara, 2002
8. http://www.cs.utah.edu/~mhall/cs4230f12/


| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Interfaces, exceptions and assertions | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |

| | | |
|---|---|---|
| Generic and collections | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Sorting and searching | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| String and regular expression processing | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Input and output systems, databases - JDBC | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Java Concurrency | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| | | |

Bibliography


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- Petcu D., Negru V., *Procesare distribuită*, Editura Universităţii de Vest, Seria Alef, Timişoara, 2002
- Foster I.; Designing and building parallel programs; An online Publishing Project of Addison-Wesley Inc.; http://www-unix.mcs.anl.gov/dbpp/, 1997.;
- Geist A., Beguelin A., Dongarra J., Jiang W., ManchekR., Sunderam V.; PVM: Parallel Virtual Machine - A User's Guide and Tutorial for Networked Parallel Computing, MIT Press, 1994.
- http://www.cs.utah.edu/~mhall/cs4230f12/


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

The content of the discipline contributes to the acquisition of the principles of the elaboration of the programs for the parallel calculation.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>- For 10: | Course evaluation and implementation of parallel algorithms. The evaluation can be done face to face or online | 66% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum | | |

| | | | |
|---|---|---|---|
| | performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>- For 10: | Checking the implementation of some algorithms. The evaluation can be done face to face or online | 34% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>C2. Carrying out projects in areas of knowledge<br><br>C3. Effective implementation of an application using computer science tools | | | |

**Completion date: September 21, 2022**

**Date of endorsement in the department: September 21, 2022**

**Date of endorsement in the Faculty Board: September 23, 2022**

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:
- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems
- Electromechanics

- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications

B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:

A. For Bachelor study programs:
- GD - General Discipline
- FD - Fundamental Discipline
- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice

B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

**SUBJECT DESCRIPTION**

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Functional Programming** | | | | | |
| 2.2 Holder of the subject | | s.l.dr.inf. Costea Felicia Mirabela | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | s.l.dr.inf. Costea Felicia Mirabela | | | | | |
| 2.4 Year of study | **III** | 2.5 Semester | **V** | 2.6 Type of the evaluation | **Ex.** | 2.7 Subject regime | **DD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **3** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **1** |
| 3.4 Total of hours from the curriculum | **42** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **14** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 10 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 11 |
| Tutorials | |
| Examinations | 3 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **33** |
| **3.9 Total of hours per semester** | **75** |
| **3.10 Number of credits** | **3** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | |
| 4.2 related to skills | Knowledge of the fundamental aspects of algorithms. Recursion |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted face-to-face or online. The course takes place with the modern techniques available: Laptop, Video projector, Blackboard or on specialized platforms for online courses (e.uoradea.ro, Microsoft Teams). |
| 5.2.for the development of the academic | - laboratory room equipped with computers: Wordpress, WP plugin, PrestaShop |

| | |
|---|---|
| seminary/laboratory/project | The lab can be conducted face-to-face or online. Laboratory work is carried out using the modern tools available in the laboratory: Personal computers, specific software programs.<br>Mandatory attendance at all laboratories<br>1 laboratory work can be recovered during the semester |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | C2 - Design of hardware, software and communication components<br>C2.1 - Description of the structure and operation of the hardware, software and communication components<br>C2.2 - Explaining the role, interaction and functioning of hardware, software and communication system components<br>C2.3 - Building hardware, software and communication components using design methods, languages, algorithms, data structures, protocols and technologies<br>C2.4 - Evaluation of functional and non-functional characteristics of hardware, software and communication components, based on some metrics<br>C2.5 - Implementation of hardware, software and communication components |
| Transversal skills | - Honorable, responsible, ethical behavior in the spirit of the law to ensure the reputation of the profession<br>- The clear and concise description in writing, in Romanian, of the results in the field of activity<br>- Demonstrating the spirit of initiative and action to update professional knowledge |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The main goal is to familiarize students with code development techniques that minimize the risk of introducing programming errors. Accumulation is desired<br>a set of knowledge on increasing the ability to write code correctly. |
| 7.2 Specific objectives | - Learning to apply recursion to eliminate state variables<br>- Learning to prove the correctness of a program<br>- Learning to identify the advantages and disadvantages of different programming styles. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| | | |

Bibliography


1. Mihai Gontineac, Programare funcționala - O introducere utilizând limbajul Haskell, Ed. Al MyllerIasi, 2006
2. Graham Huton, Programming in Haskell, http://www.cs.nott.ac.uk/~gmh/
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4. I.A. Leţia, Programare funcţională, Ed. UTPres, UTCN, 1996.
5. I.A. Leţia, L.A. Negrescu, L. Negrescu, Programare funcţională, vol. I, Ed. Albastră, 2006.
6. C. Muscalagiu - Introducere in programarea logica si limbajele de programare logica, Ed. Univ. "A.I.Cuza" Iasi, 1996
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8. David Mertz – Functional programming in Python, O'Reilly Media, 2015
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10. St. Trausanu-Matu - Programare in LISP. Inteligenta artificiala si web semantic, Ed. POLIROM, 2004
11. Albert Sweigart - Invent Your Own Computer Games with Python, Creative Commons, 2009
12. http://myri1.ieat.ro/plf/
13. http://www.haskell.org/haskellwiki/Haskell_in_education
14. https://www.python.org/
15. https://www.codecademy.com/language/python

| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Haskell functions. Recursion.<br>2. Internal representation, evaluation control, function definitions. Recursion and iteration.<br>3. LAMBDA expressions<br>4. Higher order functions, mapping.<br>5. Lists. Working with lists<br>6. Pattern matching. Symbolic processing.<br>7. Haskell higher-order functions<br>8. Lazy rating. (Haskell)<br>9. Python Functions, Lambda Expressions, Class Instances<br>10. Operations on lists.<br>11. Operations on trees, graphs.<br>12. Lazy Evaluation (Python)<br>13. Higher-order Python functions<br>14. Laboratory test (Programming in Haskell, Python). | experimental study, programming, debate.<br><br>Written test | 1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h<br>1h |
| | | |
| | | |

Bibliography


1. REEDE C., Elements of Functional Programming, Addison Wesley, New York, 1989.
2. WINSTON P.H., Artificial Intelligence, Addison Wesley, New York, 2nd edition, 1984
3. David Mertz – Functional programming in Python, O'Reilly Media, 2015
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9. http://www.haskell.org/haskellwiki/GHC
10. http://www.haskell.org/ghc/
11. https://www.python.org/
12. https://www.codecademy.com/language/python


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The discipline offers theoretical and practical knowledge directly applicable in the computer industry and in the field of information technology services. In support of the business objectives of IT companies to develop robust software products and minimize errors, this course focuses on the correctness of program development. The course presents formal methods based on the principle of mathematical induction for checking the correctness of programs. The content of the subject is consistent with similar courses of other universities in the country

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Understanding the concepts specific to the functional programming paradigm. The ability to demonstrate the correctness of programs | **The assessment can be done face to face or online.**<br>**Written or online exam.** | 70% |
| 10.5 Academic seminar | | | |
| 10.6 Laboratory | Ability to develop code. Ability to identify and correct programming errors. Compliance with deadlines. | Written test | 30% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course: Basic theoretical and practical knowledge in creating a website<br>Academic seminar:<br>Laboratory: Basic theoretical and practical knowledge in creating a website<br>Project: | | | |

**Completion date:** 14.09.2022

Course instructor
Ș.l. dr. inf. Costea Felicia Mirabela
E-mail: mira_costea@uoradea.ro

Head of department
conf. dr. ing. Pater Mirela

**Date of endorsement in the department:** 21.09.2022

**Date of endorsement in the Faculty Board:** 23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Information Technology / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | | **Theory of Probability and Mathematical Statistics** | | | |
| 2.2 Holder of the subject | | | | **Ș.l.dr.inf. Bolojan Octavia-Maria** | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | | **Ș.l.dr.inf. Bolojan Octavia-Maria** | | | |
| 2.4 Year of study | I | 2.5 Semester | II | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | FD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 2 | of which: 3.2 course | 1 | 3.3 academic seminar/laboratory/project | 1/-/- |
| 3.4 Total of hours from the curriculum | 28 | Of which: 3.5 course | 14 | 3.6 academic seminar/laboratory/project | 14/-/- |
| Distribution of time | | | | | 28 hours |
| Study using the manual, course support, bibliography and handwritten notes | | | | | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | | | | | 4 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | | | | | 6 |
| Tutorials | | | | | |
| Examinations | | | | | 4 |
| Other activities. | | | | | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **28** |
| **3.9 Total of hours per semester** | **56** |
| **3.10 Number of credits** | **2** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Students must have fundamental knowledge acquired from the following disciplines: Linear algebra, Mathematical analysis, Differential equations |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer, blackboard/whiteboard, flipcharts, chalk, markers, course notes, recommended bibliography.<br>The explanations are accompanied by reasoning based on mathematical support and applied numerical examples; they are carried out in real time, in close interaction with the students in the |

| | |
|---|---|
| | classroom. It ensures course support in electronic format and access to existing bibliographic references in the university library. It is considered both the presentation of theoretical notions, but also the solving / understanding of some applied examples. The course can be held face-to-face or online. |
| 5.2.for the development of the academic seminary | Classroom equipped with video projector and computer, blackboard/whiteboard, flipcharts, chalk, markers, course notes, recommended bibliography.<br>The seminary can be held face-to-face or online. |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | • **C1.** Using knowledges from mathematics, physics, measurement technology, technical graphics, mechanical, chemical, electricial and electronical engineering in systems engineering/ computer engineering. |
| Transversal skills | • **CT1:** Responsible execution of professional tasks, respecting the values and ethics of the engineering profession, in conditions of limited autonomy and qualified assistance, based on documentation, convergent and divergent logical reasoning, practical applicability, evaluation, self-evaluation and optimal decision: responsible executor for professional tasks;<br>• **CT2:** Identifying, describing and carrying out the processes in project management, taking over the different roles in the team and clearly and concisely describing, verbally and in writing, the results in the field of activity;<br>• **CT3:** Objective self-assessment of the need for professional development and openness to lifelong learning, as well as the efficient use of language skills, knowledge of information technology and communication for personal and professional development: aware of the need for lifelong learning. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning and understanding of different methods, procedures, probabilistic and statistical methodologies used in information technology issues. |
| 7.2 Specific objectives | ▪ Using the terminology and basic concepts of Probability Theory, as well as those of Mathematical Statistics, the discipline aims to acquire the skills of mathematical testing (statistics) of the values of the operating parameters of various electronic equipment in the field of information technology. |

**8. Contents***

| **8.1 Course** | **Teaching methods** | **No. of hours/ Observations** |
|---|---|---|
| **I. Probability Theory**<br><br>1.1. Probability field (Experimets. Field of events. Operations with events. Probability: classical and axiomatic definition. Independent events. Dependent events. Conditional probability. Total probability formula, Bayes' formula) | Lecture, Explanation, Exemplification, Solving exercices, Interactive course, Scientific Workplace .pdf slides presentation | 2 |
| 1.2. Probabilistic schemes (Binomial, Multinomial, Poisson, Hypergeometric, Geometric and Pascal schemes) | | 2 |

| | | |
|---|---|---|
| 1.3. Random variables (Distribution functions. Probability density function. Numerical characteristics of distribution functions. Operations with random variables) | with the help of the video projector; free discussions. | 2 |
| 1.4. Numerical characteristics of random variables (Mean, Dispersion, Initial and Central Moments, Variance, Covariance and Correlation, Cebâșev's inequality) | | 4 |
| 1.5. Random vectors. Distribution function. Probability density function. Covariance. Correlation coefficient. Regression. | | 2 |
| 1.6. Characteristic function. Definition. Properties. | | 2 |
| 1.7. Classical probabilistic repartitions (Binomial, Poisson, Hypergeometric, Pascal and uniform, normal, Gamma, Beta, Exponential, HI-squared, Student, Cauchy, Fisher) | | 2 |
| **II. Mathematical Statistics**<br><br>2.1. Selection (Sample) Theory notions. Repartion of sample data. Sample mean. Sample dispersion. | | 4 |
| 2.2. Estimation Theory notions. Types of estimations. Confidence Intervals method. Tests of Significance. The method of moments estimator. The method of maximum likelihood estimator. | | 4 |
| 2.3. Statistical hypothesis tests. Rejection region. Type I and II errors. Hypothesis and significance testing concerning means: The Z-test and T (Student)-test for the mean. The Chi-squared-test for variance. The F-test for the ratio of variances. | | 4 |
| | | |

**Bibliography**


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10. Vichi, M., O.Opritz, *Classification and Data Analysis, Theory and Application, Studies in Classification, Data Analysis, and Knowledge Organization*, Springer-Verlag Berlin - Heidelberg 1999.


| 8.2 Academic seminar | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Probability field. Total probability formula. Bayes' formula. Probabilistic schemes | Lecture/Oral presentation, Explanations, Exemplifications, Interactive seminary, Free discussions, Solving and explaining different types of exercises and problems / methods/ applied problems. | 2 |
| 2. Distribution function. Properties. Probability density function. | | 1 |
| 3. Numerical characteristics of distribution functions. Operations with random variables | | 1 |
| 4. Two-dimensional random variables. Covariance and correlation. Regression. | | 1 |
| 5. Characteristic function. | | 1 |
| 6. Probabilistic repartitions | | 1 |
| 7. Selection (Sample) Theory notions. | | 1 |

| | | |
|---|---|---|
| 8. Estimation Theory notions. Types of estimations. Methods for determining estimates. | | 2 |
| 9. The Z-test and T (Student)-test for the mean. | | 2 |
| 10. Hi square tests, F tests on dispersion. | | 2 |
| | | |

**Bibliography**


1. O. Agratini, P. Blaga, Gh. Coman, *Lectures on Wavelets, Numerical Methods and Statistics*, Ed. Casa Cărții de Știință, Cluj-Napoca, 2005.
2. M. Balaj, *Calculul probabilităților*, Ed. Universității din Oradea, 2007;
3. D. Blezu, *Statistică* - Ed. „Alma Mater“ Sibiu, 2003;
4. P. Blaga, Gheorghe Coman, *Statistică matematică (Ediția I)*, Universitatea “Babeș-Bolyai”, Cluj–Napoca, Centrul de formare continuă și învățământ la distanță, 2000;
5. P. Blaga, Gheorghe Coman, *Statistică matematică (Ediția II)*, Universitatea “Babeș-Bolyai”, Cluj–Napoca, Centrul de formare continuă și învățământ la distanță, 2000;
6. P. Blaga, *Teoria probabilităţilor şi statistică matematică* - Ed. Presa Clujană 2002;
7. P. Blaga, Gh. Coman, *Calcul numeric și Statistică matematică*, Universitatea “Babe ș-Bolyai”, Cluj–Napoca, Centrul de formare continuă și învățământ la distanță, 2003;
8. P. Blaga, *Statistica matematica prin Matlab*, - Ed.Polirom 2004;
9. E. Jaba, A. Grama, *Analiză stratistică prin SPSS*, - Ed.Polirom 2004;
10. Gh. Mihoc, N. Micu, *Teoria probabilităţilor şi statistică matematică*, - Ed. Did. şi Ped., Bucureşti, 1980.


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is in accordance with what is made in other university centers that have accredited this specialization. The experience gained in the relations with employers from Bihor in the students' internship activities was taken into account.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | - the correctness and completeness of the assimilated notions; - an overall understanding of the importance of the discipline studied and the connection with the other fundamental disciplines; - logical coherence; - the degree of assimilation of the specialized language; - criteria regarding the attitudinal aspects: conscientiousness, interest in individual study.<br><br>Minimum required conditions for passing the exam (mark 5): each subject is solved/treated in accordance with the minimum performance standard<br>For 10: Correct and complete answers to all subjects/questions/problems/ topics/requirements. | Written paper/exam<br><br>Students receive for solving topics/subjects/problems that cover the theoretical and applied part of the discipline.<br><br>The evaluation can be done face to face or online. | 70% |
| 10.5 Academic seminar | - ability to operate with abstract knowledge; - ability to apply in practice; - criteria regarding the attitudinal aspects: conscientiousness, interest in individual study.<br><br>Minimum required conditions for passing the | Grades awarded for the participation quality in the activities that are held during the seminars, Tests, Worksheets, Projects. | 30% |

| | | | |
|---|---|---|---|
| | examination (grade 5): each subject is solved/treated in accordance with the minimum performance standards.<br><br>For 10: Correct and complete answers to all subjects/questions/problems/ topics/requirements. | | |
| 10.6 Laboratory | | | |
| 10.7 Project | | | |

10.8 Minimum performance standard:

- Defining notions, stating theoretical results
- Identifying and selecting methods to approach simple concrete problems
- Elaboration of algorithms to solve a problem with a low degree of difficulty
- Realization and completing demonstrations for studied mathematical results, with medium degree of difficulty
- Mathematical modeling of a problem with a low degree of difficulty

Course / Academic seminar:

Minimum requirements for grade 5:

- Attendance at least 80% of the total number of course and seminar hours
- Solving the individual topics within the seminar (50%)
- Solving 50% of the exam applications

Requirements for grade 10:

- Attendance to at least 80% of the total number of course and seminar hours
- Integral solving of the individual topics within the seminar
- Active participation in all activities organized during the course and seminar

**Completion date:**
**08.09.2022**

Course/Seminary holder:
Ș.l. dr. inf. Bolojan Octavia-Maria
obolojan@uoradea.ro

**Date of endorsement in the department:**
**21.09.2022**

Head of the Department:
Conf.univ.dr.ing.Mirela PATER
mpater@uoradea.ro

**Date of endorsement in the Faculty Board:**
**23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Java Programming** | | | | |
| 2.2 Holder of the subject | | | **Pater Alexandrina Mirela** | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | **Zoltan Andras** | | | | |
| 2.4 Year of study | II | 2.5 Semester | 3 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | SD - Specialized Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/0 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/0 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 14 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 21 |
| Tutorials | 3 |
| Examinations | 3 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **69** |
| **3.9 Total of hours per semester** | **125** |
| **3.10 Number of credits** | 5 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer. The course can be held face to face or online. |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with computers that are connected to the Internet and dedicated software installed.<br>The laboratory / project can be held face to face or online |

| **6. Specific skills acquired** | |
|---|---|
| Professional skills | CP2. Designing hardware, software and communication components |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | The course aims to familiarize students with the object-oriented programming technique. The course introduces the basics of object-oriented programming with Java program examples. In the laboratory, students implement and verify on the computer both the programs discussed in the course and other proposed programs, deepening the theoretical and practical notions acquired. It was considered necessary to study a high-level programming language with widespread and topicality, namely the Java language. |
| 7.2 Specific objectives | **Theoretical knowledge:**<br>• Adequate use in professional communication of the concepts of computability, complexity, programming paradigms and modeling of computing and communications systems<br>• Use of specific theories and tools (algorithms, schemes, models, etc.) to explain the operation and structure of software systems<br>• To know the fundamental concepts of object-oriented programming, the concepts of classes and objects, constructors and destroyers, the techniques of overloading operators and functions, the technique of inheritance and derivation of classes, of polymorphism<br>• To know the objective facilities offered by the Java programming language<br>**Skills acquired:**<br>• Master and use the Java programming language<br>• To use in the creation of applications the objective facilities offered by the Java programming language<br>• To solve various problems using the concepts of classes, objects<br>• Solve various problems using the techniques of overloading operators and functions, inheritance and polymorphism<br>• Evaluate and justify the effectiveness of methods chosen for implementation and adopt optimal solutions from different points of view |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Fundamental concepts in OOP - The premises of OOP. Fundamental concepts. Short characterization of the Java language. | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 2. Basics of Java: Object and Driver Classes; Data types and operators; Strings of characters | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 3. Conditional statements; Statements of control | Powerpoint presentation with the help of the video | 2 hours |

| | | |
|---|---|---|
| | projector; free discussions; | |
| Chapter 4. Strings and exceptions | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 5. Classes, objects and methods | Powerpoint presentation with the help of the video projector; free discussions; | 4 hours |
| Chapter 6. Parameters and overloading methods. | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 7. Static modifier and nested classes | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 8. Inheritance. | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 9. Polymorphism | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 10. Java interfaces | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 11. Abstract and generic classes | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 12. Collections | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| Chapter 13. Sorts and searches | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |

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[1] B. Eckel, *Thinking in Java,* 3/e, Prentice Hall, 2002
[2] H. M. Deitel, P. J. Deitel, *Java: How to Program*, 4/e, Prentice Hall, 2003
[3] J. Gosling, B. Joy, G. Steele, G. Bracha, *The JavaTM Language Specification*, 3/e, Addison-Wesley, 2005
[4] S. Tănasa, C. Olaru, S. Andrei, *Java de la 0 la expert*, Editura Polirom, 2003
[5] C. S. Horstmann and G. Cornell, *Core Java 2: Vol.1-Fundamentals*, 6/e, Prentice Hall, 2002
[6] C. S. Horstmann, *Computing concepts with Java 2 Essentials*, 3/e, John Wiley, 2003
[7] D. Logofătu, *Algoritmi fundamentali în Java. Aplicații*, Editura Polirom, 2007

| | | |
|---|---|---|
| https://uoradea-my.sharepoint.com/personal/alexandrina_pater_didactic_uoradea_ro/Documents/PCLP/Programarea%20calculatoarelor%20%C5%9Fi%20limbaje%20de%20programare%20%E2%80%93%20%C3%AEndrum%C4%83tor%20de%20laborator.pdf | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Labor protection training<br>Introduction. Technologies used: Eclipse, IntelliJ | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Class and object applications, data types and operators, strings | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Statement applications | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| String applications and exceptions | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Class applications, objects and methods | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Applications Parameters and overloading methods | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Static modifier applications and nested classes | Powerpoint presentation with the help of the video projector;<br>Applications - programs;<br>Assistance in using software development; | 2 hours |
| Inheritance applications | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |

| | | |
|---|---|---|
| Applications of polymorphism | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Interface applications | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Abstract and generic class applications | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Collection applications | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Sorting and searching applications | Powerpoint presentation with the help of the video projector; Applications - programs; Assistance in using software development; | 2 hours |
| Final test | | 2 hours |

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[1] H. M. Deitel, P. J. Deitel, *Java: How to Program*, 4/e, Prentice Hall, 2003
[2] S. Tanasa, C. Olaru, S. Andrei, *Java de la 0 la expert*, Ed. Polirom, ISBN 9789734624058, 2017
[3] Cay Horstmann, *Core Java – Fundamentals (Core series)* 11 th Edition, Oracle Press, ISBN-13: 987-0135166307, ISBN-10: 0135166306, 2022
[4] B. Eckel, *Thinking in Java,* 3/e, Prentice Hall, 2002
[5] J. Gosling, B. Joy, G. Steele, G. Bracha, *The JavaTM Language Specification*, 3/e, Addison-Wesley, 2005
[6] S. Tănasa, C. Olaru, S. Andrei, *Java de la 0 la expert*, Editura Polirom, 2003
[7] C. S. Horstmann and G. Cornell, *Core Java 2: Vol.1-Fundamentals*, 6/e, Prentice Hall, 2002
[8] C. S. Horstmann, *Computing concepts with Java 2 Essentials*, 3/e, John Wiley, 2003
[9] D. Logofătu, *Algoritmi fundamentali în Java. Aplicaţii*, Editura Polirom, 2007
https://uoradea-my.sharepoint.com/personal/alexandrina_pater_didactic_uoradea_ro/Documents/PCLP/Programarea%20calculatoarelor%20%C5%9Fi%20limbaje%20de%20programare%20%E2%80%93%20%C3%AEndrum%C4%83tor%20de%20laborator.pdf

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

The content of the discipline is found in the curriculum of Computer and Information Technology specialization from other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.) , and knowledge of the basic principles of object-oriented programming and implementation of software components, implementation of programs in areas of knowledge are stringent requirements of employers in the field (Qubiz, DecIT, Access, Trencadis, Diosoft, Five Tailors, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard<br>For 10: Knowledge Understanding | Written paper<br>The evaluation can be done face to face or online | 67% |
| 10.5 Academic seminar | - | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>For 10:Knowledge and understanding;Ability to explain and interpret;Complete and correct solution of the requirements. | - Laboratory / practical works<br>-Tests during the semester<br>The evaluation can be done face to face or online | 33% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Selection and independent use of learned methods and algorithms for known standard situations as well as completion of calculations.<br>Development and implementation of algorithms using learned principles.<br>The timely solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology.<br>Modeling a typical engineering problem using the formal apparatus characteristic of the field. | | | |

**Completion date: 5.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | *Computers and Information Technology* |
| 1.4 Field of study | *Computers and Information Technology* |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | *Computers & Information Technology & Automation and Applied Informatics* / **Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | *The structure and organization of computers* | | | | | |
| 2.2 Holder of the subject | | Prof.dr.habil.eng. Daniela Elena Popescu | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **lect.dr.ing. Mircea-Petru Ursu** | | | | | |
| 2.4 Year of study **II** | | 2.5 Semester **4** | | 2.6 Type of the evaluation | **Ex** | 2.7 Subject regime | **DD** |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **2/1** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 28 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | **14** |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| 3.7 Total of hours for individual study | **56** |
| 3.9 Total of hours per semester | **112** |
| 3.10 Number of credits | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - The course can be held face to face or online "<br>- attendance at least 50% of the courses |
| 5.2.for the development of the academic seminary/laboratory/project | - The seminar / laboratory / project can be held face to face or online<br>- Mandatory presence at all laboratories;<br>- Students must have completed the theoretical part of the paper; |

| | |
|---|---|
| | - A maximum of 4 works can be recovered during the semester (30%);<br>- The frequency at laboratory hours below 70% leads to the restoration of the discipline |
| **6. Specific skills acquired** | |
| Professional skills | CP3. Problem solving using Computer Science and engineering tools<br><br>CP5. Design, life cycle management, integration and integrity of hardware, software and communications systems |
| Transversal skills | CT1. Applying, in the context of compliance with the law, intellectual property rights (including technology transfer), product certification methodology, principles, norms and values of the code of professional ethics within its own rigorous, efficient and responsible work strategy<br><br>CT2. Identify roles and responsibilities in a multi-specialized team decision-making and assigning tasks, with the application of relationship techniques and efficient work within the team |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ The discipline aims to familiarize students with specialization with as much theoretical and practical knowledge related to the structure and operation of computer systems, so that students are able to design and implement computer systems as efficient as possible. |
| 7.2 Specific objectives | • The course aims to present constructive solutions at the architectural level, where the hardware and software concepts complement each other for the benefit of a structure designed and as flexible as possible for users.<br>• The course aims to acquire knowledge on how to operate and use the components of the structure of a computer, as well as the development of programming skills of the hardware structure<br>• Laboratory: Fixing the architecture, the external interface signals and the instruction set, for the sequential multiplication device. Realization of the data processing unit at the level of the unit being designed, implementation of the control unit and the block of control circuits |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| ***Chapter I. Basic notions related to the architecture, organization, function and structure of computers***<br>The basic structure of a computer system. Description of its functional units: Input unit, Extraction unit, Internal memory, External memory. Arithmetic and Logic Unit and Command Unit. Using addressing with the base. Possibilities for addressing operands in computers with General registers. Addressing operands in computers through general registers. The way in which the operands are brought Execution of the instruction. Sequencing. Generation of synchronization pulses with variable period, and prescribed duration, conditioning possibilities. The cycle of carrying out the instruction as a whole. | • Free course presentation with video projector / overhead projector and blackboard in an interactive way: punctuate from time to time questions for students in order to increase the degree of interactivity<br>• Indication of topics for documentation and individual study | 6 hours |
| ***Chapter II Memory*** | | 16 hours |

| | | |
|---|---|---|
| The structure of working memory (OM). RAM memory. Memory organized in blocks. Memory organized on modules. Memory with multiple access points. Cache memory Fast buffer with modular structure. Cache memory organized with blocks with arbitrary correspondence. Cache memory with arbitrary addressing by sectors. Cache memory addressing on databases. Associative memory (AM). Complete associative memory. Stack memory. Buffer memory. Memory protection. External memory. Virtual memory Static memory allocation. Dynamic memory allocation. Dynamic relocation. Example of dynam allocation and relocation device. | | |
| ***Chapter. III Central processing unit.*** Structure of the Arithmetic and Logic Unit (ALU). The adder. Central unit. UC structure. Bringing the instruction to the IBM 360. Blocking the circuit for fetching data. Generating orders. Microprogrammed control. Interrupt circuit block | | 6 hours |

Bibliography


- Course notes Architecture systems computing, D.E.Popescu, posted on the Office platform for CTI students
- William Stalings, Computer Organization and Architecture, 9th Edition, March 11, 2012 | ISBN-10: 013293633X | ISBN-13: 978-0132936330, Computer Science Series
- Popescu Daniela E .. - Architecture and organization of conventional computing systems ,, University of Oradea Publishing House, Oradea, 2002, ISBN 973-613-225-0, 2002
- D.E.Popescu, C.Popescu, Architecture of computer systems, University Publishing House, laboratory supervisor, ISBN 973-613-225-9, 2002
- Popescu Daniela E., Introduction to the architecture of computer systems, MATRIX ROM Bucharest publishing house, ISBN 973 - 685-067 –6
- K.Hwang, F.A. Briggs - Computer Architecture and Parallel processing, Treira Publishing House, Mc Graw - Hill Book company 1987
- Mircea Popa, Introductions in parallel and unconventional architectures, AS Computer Press Publishing House Timişoara 1992


| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 11. Presentation of the laboratory, labor protection norms and conventional signs specific to the field of computer systems - general information on the architecture of computer systems.<br>2. Coding of information in computer systems - addition and subtraction in complement to 2.<br>3. Multiplication and division operations in complement to 2.<br>4. The structure of the data processing part for the arithmetic and logic unit.<br>5. Implementation of the control unit for ALU by the state table method.<br>6. Assessment of knowledge.<br>7. Implementation of the control unit for ALU by the method of the delay element.<br>8. Implementation of the control unit for ALU by the method of the numerator in sequence. Comparisons between the three methods.<br>9. Assessment of knowledge.<br>10. Wired implementation of the control unit of a processor with a reduced set of instructions by the method of the numerator in sequence.<br>11. Methods of microprogrammed implementation of the control unit for a multiplier in complement to 2. | In each laboratory class, with the help of the video projector, the theoretical part is deepened by examples (which illustrate calculation methods, particular cases, error prevention, etc.), then students are asked to solve practical applications.<br>The evaluation of students is done through two tests. The arithmetic mean of the marks of these tests represents the mark with which they enter the exam. | 2 hours are allocated for each of the 14 detailed points of the laboratory activity. |

| | | |
|---|---|---|
| 12. Microprogrammed implementation of the control unit for a microprocessor.<br>13. Assessment of knowledge.<br>14. Recovery of laboratories and conclusion of the situation. | | |


Bibliography

1. D.E.Popescu, C.Popescu, Arhitectura sistemelor de calcul, EdituraUniversitati, îndrumător de laborator, ISBN 973-613-225-9, 2002
2. William Stalings, Computer Organization and Architecture, 9th Edition, March 11, 2012 | ISBN-10: 013293633X | ISBN-13: 978-0132936330, Computer Science Series


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computer and Information Technology specializations and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc. ), and knowledge of the architecture and organization of computer systems as well as their operation and design is a stringent requirement of employers in the field (Rds & Rcs, Plexus, Neologic, Celestica, Keysys, etc.).

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5) in accordance with the minimum performance standard:<br>- it is necessary to know the fundamental notions required in the subjects, without presenting details on them<br><br>For 10:<br>- for grade 10, a thorough knowledge of all is required | The evaluation can be done face to face or online depending on the situation imposed | 70% |
| 10.6 Laboratory | - for grade 5, broadly knowing the problems of artificial intelligence<br>Specifically: For grade 5: correct answer to at least 1 question out of 3 for each paper.<br>- for grade 10, detailed knowledge of search algorithms, optimization and problems related to evolutionary computation, respectively neural networks<br>Specifically: For grade 10: correct answer to all questions. | **Tests during the semester**<br>The evaluation of students is done through two tests, taken during the semester. The arithmetic mean of the marks of these tests represents the mark with which they enter the exam. Students can also get extra points, depending on their participation in the laboratory and solving exercises with a higher degree of difficulty. These points can be used to calculate the test score. | 30% |
| 10.8 Minimum performance standard:<br>Assimilation of detailed knowledge about the construction, operation and design of central processing units for digital computers, as well as about the organization of different types of memories associated with them.<br>The studied design methods are exemplified on existing architectures, including the study of special architectures. | | | |

| |
|---|
| The term solution, in individual activities and activities carried out in groups, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology. Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level. Development of team spirit, spirit of mutual help, awareness of the importance of training during the semester for good and sustainable results, awareness of the importance of research, own research related to learning (library, internet), cultivating a discipline of work, done correctly and on time |

**Completion date:**
08.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Applications of database management systems** | | | | |
| 2.2 Holder of the subject | | | Prof. dr. ing. Győrödi Cornelia Aurora | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | Sef. Lucr. Dr. Ing. Pecherle George Dominic | | | | |
| 2.4 Year of study | III | 2.5 Semester | 1 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/1 |
| 3.4 Total of hours from the curriculum | 70 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 18 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 10 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 10 |
| Tutorials | 4 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **80** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 6 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions)<br>Databases course |
| 4.2 related to skills | Understanding the theoretical and practical knowledge used to the design and implementation of relational database management applications. |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer - The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with video projector and computers that are connected to the internet, and they have installed Oracle 12c software. The laboratory can take place face to face or online |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | C2. Designing hardware, software and communication components<br>C3. Solving problems using computer science and engineering instruments |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning the advanced concepts of relational databases and the PL/SQL language to optimize the interface of applications with the database or other applications. |
| 7.2 Specific objectives | ▪ Advanced concepts of relational databases, namely: The PL / SQL relational language, stored procedures and functions, triggers, packages, database security control, transaction management as well as object-oriented database concepts. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. PL/SQL language | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| 2. Data manipulation using PL/SQL language. Control structures in PL/SQL | | 2 hours |
| 3. Data types composed in PL/SQL. Defining cursors. Cursors with parameters. Exceptions in PL/SQL | | 4 hours |
| 4. Stored procedures and functions | | 2 hours |
| 5. Packages | | 2 hours |
| 6. Dynamic SQL | | 2 hours |
| 7. Libraries and Languages for Programming | | 2 hours |
| 8. Security control of database | | 2 hours |
| 9. Transaction control | | 2 hours |
| 10. Interlock study | | 2 hours |
| 11. Restoring the database | | 4 hours |
| 12. Object-oriented databases. Principles of object modeling | | |

Bibliography


1. Ion Lungu, Anca Andreescu, Adela Bâra, Anda Belciu, Constanța Bodea, Iuliana Botha, Vlad Diaconița, Alexandra Florea, **Cornelia Győrödi**, " Tratat de baze de date. Sisteme de gestiune a bazelor de date ", Volumul 2, Editura ASE, 2015, ISBN 978-606-505-472-1, nr. pag 375.
2. Győrödi Cornelia, Pecherle George, "*Baze de date relaţionale. Teorie și aplicații în Oracle*"**,** Editura Universitati, 2008, ISBN 978-973-759-460-0.
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4. David M. Kroenke, David J. Auer – Database Processing: Fundamentals, Design and Implementation, 15th Edition, Pearson, 2019, ISBN: 978-0134802749.

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6. Abraham Silberschatz, Database System Concepts, 7th Ed., McGraw-Hill, 2019, ISBN 9780078022159.
7. Oracle Education."Develop PL/SQL Program Units", Oracle Corporation, 2019.
8. Oracle Education."PL/SQL Fundamentals", Oracle Corporation, 2019.
9. Oracle Academy iLearning (https://academy.oracle.com)
10. https://e.uoradea.ro/course/view.php?id=6138 Materials (courses and laboratories)

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Getting started with database management systems. Installing and configuring Oracle SQL Developer Data Modeler systems, Oracle 12c. | Oral presentation.<br><br>Students work with the following tool:<br>-Oracle Application Express (https://iacademy.oracle.com/ )<br><br>The students are assessed by a practical test using computer from laboratory topics. | 2 hours |
| 2. Entity-relationship diagram for a practical application. | | 2 hours |
| 3. Normalization of the relational database. Normal forms FN1, FN2, FN3, FNCB of the concept model. Practical applications - case study. | | 2 hours |
| 4. Transforming the conceptual model into a physical model. Practical applications - case study. | | 4 hours |
| 5. SQL language. The SQL command for querying a table | | 2 hours |
| 6. Join operations in SQL language | | 2 hours |
| 7. The Data manipulation language in SQL. Defining of index files and views | | 2 hours |
| 8. Advanced join techniques | | 2 hours |
| 9. Aggregate functions in SQL | | 2 hours |
| 10. Subqueries in SQL. Sets of operators in SQL | | 2 hours |
| 11. Controlling access to the relational database. GRANT and REVOKE commands. | | 2 hours |
| 12. Transaction control in the relational database. Commit, Savepoint and Rollback commands. | | 2 hours |
| 13. Design and implementation of a library management application. | | |
| 14. Final test | | 2 hours |

Bibliography

1. Ion Lungu, Anca Andreescu, Adela Bâra, Anda Belciu, Constanța Bodea, Iuliana Botha, Vlad Diaconița, Alexandra Florea, **Cornelia Győrödi**, " Tratat de baze de date. Sisteme de gestiune a bazelor de date ", Volumul 2, Editura ASE, 2015, ISBN 978-606-505-472-1, nr. pag 375.
2. Győrödi Cornelia, Lungu Ion "*Sisteme de baze de date avansate*", Editura Universității din Oradea, 2011, ISBN 978-606-10-0447-8, nr. pag 350.
3. Győrödi Cornelia, Pecherle George, "*Baze de date relaţionale. Teorie şi aplicaţii în Oracle*", Editura Universitati, 2008, ISBN 978-973-759-460-0.
4. Oracle Application Express (https://iacademy.oracle.com/ )
5. Oracle Academy iLearning (https://academy.oracle.com)
6. https://e.uoradea.ro/course/view.php?id=6138 Materials (courses and laboratories)

| 8.3. Project | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Implementing a practical application from a list published on the online platform https://e.uoradea.ro/course/view.php?id=6138<br>The project will be implemented in one of the development environments: Oracle Server (Oracle Database 11g or Oracle12, Oracle Developer Suite 12), MySQL 8, or SQL Server 2018.<br>For each project, both the practical application and a description in the form of a report will be presented.<br>The report will contain: (a) Analysis and specification of the requirements and operation of the designed | Oral presentation | 1 hours/ week<br><br>14 hours |

| | | |
|---|---|---|
| application. (b) Description and interpretation of results obtained. | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- 

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved<br><br>For 10: 100% of the subjects from the final exam should be correctly solved | Semester exam – written | 50% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br><br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Oral/written | 20% |
| 10.7 Project | A small-scale individual practical application project covering the topics mentioned in the laboratory list | Project Evaluations - oral presentations | 30% |

| |
|---|
| 10.8 Minimum performance standard:<br>Course: 50% of the maximum score of the final exam<br>Academic seminar:<br>Laboratory: 50% of the maximum score of the laboratory evaluations<br>Project: 50% of the maximum score of the Project Evaluations |

| | Course instructor | Head of department |
|---|---|---|
| **Completion date:**<br>**05.09.2022** | prof. dr. ing. Cornelia Győrödi<br>E-mail: cgyorodi@uoradea.ro | conf. dr. ing. Pater Mirela |

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Bachelor |
| 1.6 Study program/Qualification | Computers/ Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **Advanced Operating Systems** | | | | |
| 2.2 Holder of the subject | | | Prof. dr. ing. Gyorodi Robert Stefan | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | Sef. Lucr. Dr. Ing. Pecherle George Dominic<br>Sef. Lucr. Dr. Inf. Costea Mirabela | | | | |
| 2.4 Year of study | III | 2.5 Semester | 2 | 2.6 Type of the evaluation | Ex | 2.7 Subject regime | SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2/1 |
| 3.4 Total of hours from the curriculum | 70 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28/14 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 10 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 8 |
| Tutorials | 2 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **30** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions)<br>Operating systems |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector and computer.<br>The course can be held face to face or online |
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory equipped with video projector and computers that are connected to the internet. They have installed Visual Studio 2019; Linux server with development tools using the C / C ++ language, CLion, Oracle |

| | |
|---|---|
| | VirtualBox for running virtual machines. The laboratory can take place face to face or online |
| **6. Specific skills acquired** | |
| Professional skills | C2. Designing hardware, software and communication components<br>C5. Designing, lifecycle management, integration and integrity of hardware, software and communication systems |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Learning the advanced concepts of operating systems and the possibilities of developing applications based on them. |
| 7.2 Specific objectives | ▪ The course is a continuation of the Operating Systems course and focuses on more advanced operating system design concepts, namely: the architecture and basic concepts of UNIX / Linux operating systems, Windows and the Win32 / 64 subsystem. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Win32/64 System - Evolution and System Components | Powerpoint presentation with the help of the video projector; free discussions; | 2 hours |
| 2. Win32/64 System - File Subsystem – NTFS, FAT, ReFS | | 4 hours |
| 3. Win32/64 System - Principles of designing an application | | 2 hours |
| 4. Win32/64 System - Case Study - Designing a Model Application | | 2 hours |
| 5. Win32/64 System - Thread Execution | | 2 hours |
| 6. Win32/64 System – Services | | 2 hours |
| 7. Win32/64 System - Network Communication and Security System | | 2 hours |
| 8. Memory Management | | 2 hours |
| 9. Virtual Memory | | 2 hours |
| 10. Storage Systems | | 2 hours |
| 11. File system interface | | 2 hours |
| 12. Implementing file systems | | |
| 13. I/O subsystems | | 2 hours |
| 14. Protection | | 2 hours |

Bibliography


1. Sisteme de Operare. Teorie şi Aplicaţii – Robert Győrödi – Editura Universităţii din Oradea, 2000, ISBN 973-8083-22-2
2. Operating System Concepts Global 10th Ed - Abraham Silberschatz, Peter Galvin and Greg Gagne - John Wiley & Sons, Inc., 2019, ISBN 1119454085
3. Operating Systems: Internals and Design Principles, 9/E - William Stallings - Pearson, 2018, ISBN 9781292214344

<table>
<tr><td colspan="3">4. Modern Operating Systems: Global Edition, 4/E - Tanenbaum - Pearson – 2015, ISBN 1292061421<br>5. Distributed Systems, 3.01 - M. van Steen, A. S. Tanenbaum - 2017, ISBN 9789081540629<br>6. The Linux Programming Interface - Michael Kerrisk - No Starch Press - 2010, ISBN 978-1-59327-220-3<br>7. Hands-On System Programming with Linux - Kaiwan N Billimoria - Packt Publishing - 2018, ISBN 978-1-78899-847-5<br>8. PowerShell for SysAdmins - Adam Bertram - No Starch Press - 2020, ISBN 1593279183<br>9. https://e.uoradea.ro/course/view.php?id=6139 Materials (courses and laboratories)</td></tr>
<tr><td>8.2 Academic laboratory</td><td>Teaching methods</td><td>No. of hours/ Observations</td></tr>
<tr><td>1. Interprocess communication through messages</td><td rowspan="11">Powerpoint presentation with the help of the video projector/Oral presentation.<br><br>The students are assessed by a practical test using computer from laboratory topics.</td><td>2 hours</td></tr>
<tr><td>2. Interprocess communication through Shared Memory</td><td>2 hours</td></tr>
<tr><td>3. Interprocess communication through Sockets</td><td>4 hours</td></tr>
<tr><td>4. Introduction to using WIN32 API functions.</td><td>4 hours</td></tr>
<tr><td>5. Working with directories/ folders.</td><td>2 hours</td></tr>
<tr><td>6. File management</td><td>2 hours</td></tr>
<tr><td>7. Threads</td><td>4 hours</td></tr>
<tr><td>8. Services</td><td>4 hours</td></tr>
<tr><td>9. The principles of realization of a WIN32 application.</td><td>4 hours</td></tr>
<tr><td>10. Working with files and process management in UNIX</td><td>2 hours</td></tr>
<tr><td>11. Final test</td><td>2 hours</td></tr>
<tr><td>8.3. Project</td><td>Teaching methods</td><td>No. of hours/ Observations</td></tr>
<tr><td>Carrying out experiments related to:<br>• visualization of the internal structures of an operating system in execution<br>• viewing loaded drivers and tracking I / O activities<br>• viewing security structures and associated tokens<br><br>You can choose from the following themes:<br>• a file system driver with a given structure and its integration into the Windows system using the Windows Driver Development Kit for the kernel-level driver OR one of the existing libraries that allow the implementation of a user-level driver<br>• a shell that can be integrated into the Linux or Windows operating system<br>• an operating system kernel with basic subsystems (processes, process planning, memory management, simple file subsystem) - team project</td><td>A practical application project covering one of the topics mentioned in the project list.<br><br>Project evaluation:<br>- compliance with the requirements of the chosen theme: 25%<br>- installation, compilation and operation of the program: 25%<br>- content of the report: 25%<br>- verification of theoretical knowledge related to the realization of the project: 25%</td><td>1 hours/ week<br><br>14 hours</td></tr>
<tr><td colspan="3">Bibliography<br>1. Győrödi Robert, Mogyorosi Stefan “Sisteme de Operare. Aplicatii practice”, Editura Universității din Oradea, 2008, ISBN 978-973-759-624-6, nr. pag 198.<br>2. https://e.uoradea.ro/course/view.php?id=1941 Materials (courses and laboratories)</td></tr>
</table>

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline corresponds to the requirements necessary to acquire the concepts underlying the design and implementation of an operating system.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: 50% of the subjects from the final exam should be correctly solved<br>- For 10: 100% of the subjects from the final exam should be correctly solved | Semester exam – written | 40% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | - | - |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: 50% of the problems from the final laboratory test should be correctly solved<br>- For 10: 100% of the problems from the final laboratory test should be correctly solved | Oral/written | 30% |
| 10.7 Project | A practical application project covering one of the topics mentioned in the project list.<br>Project evaluation:<br>- compliance with the requirements of the chosen theme: 25%<br>- installation, compilation and operation of the program: 25%<br>- content of the report: 25%<br>- verification of theoretical knowledge related to the realization of the project: 25% | Project Evaluations - oral presentations | 30% |
| 10.8 Minimum performance standard:<br>Course: 50% of the maximum score of the final exam | | | |

| |
|---|
| Academic seminar:<br>Laboratory: 50% of the maximum score of the laboratory evaluations<br>Project: 50% of the maximum score of the project evaluations |

| | Course instructor | Head of department |
|---|---|---|
| **Completion date:**<br>06.09.2022 | prof. dr. ing. Győrödi Robert<br>E-mail: rgyorodi@uoradea.ro | conf. dr. ing. Pater Mirela |

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Department of Computers and Information Technology** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Computers / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Design with microprocessors** | | | | | |
| 2.2 Holder of the subject | | prof. dr. ing. Vari-Kakas Ştefan | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | lect. dr. ing. Poszet Otto / prof. dr. ing. Vari-Kakas Ştefan | | | | | |
| 2.4 Year of study | 3 | 2.5 Semester | 2 | 2.6 Type of the evaluation | Ex. | 2.7 Subject regime | DD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/1/1 |
| 3.4 Total of hours from the curriculum | 56 | of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/14/14 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography, and handwritten notes | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 6 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 20 |
| Tutorials | 2 |
| Examinations | 2 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | 44 |
| **3.9 Total of hours per semester** | 100 |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Microprocessor systems |
| 4.2 related to skills | Digital electronics II |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | The course can be conducted face to face with a projector or online. |
| 5.2.for the development of the academic seminary/laboratory/project | The laboratory/project can be carried out face to face or online, requiring personal computers, PIC microcontroller development kit, AVR Butterfly, Arduino module or Raspberry Pi. |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | ▪ Design of hardware, software and communications components<br>▪ Design, life cycle management, integration and integrity of hardware, software and communication systems<br>▪ Maintenance and operation of hardware, software and communication systems<br>▪ Elaboration of a microsystem project through computer-aided design<br>▪ Programming the interface circuits<br>▪ Working with the technique of interrupts in a microsystem<br>▪ Programming a microcontroller<br>▪ Development of a microcontroller system |
| Transversal skills | ▪ Honorable, responsible, ethical behavior, in the spirit of the law to ensure the reputation of the profession<br>▪ Clear and concise written description of the results in the field of activity, including by consulting documentation in a language of international circulation<br>▪ Demonstrating the spirit of initiative and action to update professional knowledge |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Knowledge of the principles of designing modules for multimicroprocessor systems, assembly language programming and development of microcontroller systems |
| 7.2 Specific objectives | ▪ Knowledge of the principles of designing a multiprocessor system<br>▪ Understanding the operation of the interface block with the multiprocessor bus<br>▪ Knowledge of the architecture and components of a personal computer<br>▪ Knowledge of advanced microprocessor facilities<br>▪ Understanding how to develop a microcontroller application program<br>▪ Understanding the architecture and how to use a microcontroller |

**8. Contents**

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Multiprocessor bus | Lecture | 2 |
| Design of modules for multimicroprocessor systems | Lecture | 2 |
| Personal computers. Processors and memories | Lecture | 2 |
| Personal computers. Buses and interfaces | Lecture | 2 |
| Advanced processors | Lecture | 2 |
| Microcontrollers. PIC microcontroller family | Lecture | 2 |
| PIC architecture 16/18/24. Instruction set | Lecture | 2 |
| Power, clock, reset, instruction cycle | Lecture | 2 |
| Parallel ports | Lecture | 2 |
| Interrupts | Lecture | 2 |
| Timing | Lecture | 2 |
| Asynchronous serial I/O | Lecture | 2 |
| Synchronous serial I/O. I2C bus | Lecture | 2 |
| Data acquisitions and conversions | Lecture | 2 |

Bibliography
1. Vari K. Ştefan, Microprocesoare şi microcalculatoare, Editura Universităţii din Oradea, 2002.
2. S. Mueller, PC Repair and Upgrading, Que Publishing, 2015.
3. R. B. Reese, J. W. Bruce, Microcontrollers: from Assembly Language to C Using the PIC24 Family, Cengage Learning PTR, 2014.
4. T. Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes, 2009.
5. M. A. Mazidi, D. Causey, R. McKinlay, PIC Microcontroller and Embedded Systems, MicroDigitalEd, 2016.

| 8.1 Laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|

| | | |
|---|---|---|
| Presentation of the works and the development environment | Debate, measurements, processing of results | 2 |
| Microcontroller programming techniques | Debate, measurements, processing of results | 2 |
| Connecting and controlling the LEDs | Debate, measurements, processing of results | 2 |
| Connecting and controlling displays | Debate, measurements, processing of results | 2 |
| Connecting and controlling the keyboard | Debate, measurements, processing of results | 2 |
| Using the A/D converter | Debate, measurements, processing of results | 2 |
| Evaluation of laboratory activity | Presentation of reports, questions | 2 |
| 8.2 Project | Teaching methods | No. of hours/ Observations |
| Defining the design theme | Debate, exemplification, individual and group work, verification and discussions | 2 |
| Study of the module with microcontroller. Development of the block diagram of the application | Debate, exemplification, individual and group work, verification and discussions | 2 |
| Elaboration of the hardware electrical scheme | Debate, exemplification, individual and group work, verification and discussions | 2 |
| Interface design | Debate, exemplification, individual and group work, verification and discussions | 2 |
| Development of application programs | Debate, exemplification, individual and group work, | 2 |

| | | |
|---|---|---|
| | verification and discussions | |
| Elaboration of documentation | Debate, exemplification, individual and group work, verification and discussions | 2 |
| Project evaluation | Defense, questions | 2 |

Bibliography


1. Vari Kakas Şt., Sisteme cu microprocesoare (îndrumător de laborator), Universitatea din Oradea, 2002.
2. F. Dragomir, O. E. Dragomir, Programarea în limbaj de asamblare a microcontrolerelor, Matrix Rom, 2013.
3. Microchip, PICDEM Lab Development Board. User's Guide, 2009.
4. Vari Kakas Şt., Sisteme cu microprocesoare (îndrumător de proiect), Universitatea din Oradea, 2004.
5. Arduino Home, https://www.arduino.cc/


**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The discipline provides theoretical and practical knowledge directly applicable in the computer industry and in the field of information technology services.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard | Written exam. | 70% |
| 10.5 Academic seminar | | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard | Reports presentation. Questions. | Condition + 10% |
| 10.7 Project | Practical project. | Application presentation. Defense. | Condition + 20% |
| 10.8 Minimum performance standard:<br>Course: Pass mark from 50% of the requirements met.<br>Academic seminar:<br>Laboratory: Pass.<br>Project: Pass. | | | |

**Completion date:**
12.09.2022

**Date of endorsement in the department:**
21.09.2022

**Date of endorsement in the Faculty Board:**
23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **1) Computers and information technology** |
| 1.4 Field of study | **2) Computers and information technology** |
| 1.5 Study cycle | **3) Bachelor** |
| 1.6 Study program/Qualification | **4) / 5) Computer Science** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | | **[6] Software engineering I** | | | | |
| 2.2 Holder of the subject | | | Prof. IOAN MANG | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | | Associate Assistant dr. OVIDIU COMAN | | | | |
| 2.4 Year of study | III | 2.5 Semester | 6 | 2.6 Type of the evaluation | [7] Ex | 2.7 Subject regime | [8] SD |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 0/2 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 0/28 |

| Distribution of time | hours |
|---|---|
| Study using the manual, course support, bibliography and handwritten notes | 38 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 20 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 28 |
| Tutorials | 4 |
| Examinations | 8 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **98** |
| **3.9 Total of hours per semester** | **154** |
| **3.10 Number of credits** | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom equipped with video projector - Attendance at least 50% of the courses |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Room equipped with computers and specific programs - Mandatory attendance at all laboratories; - A maximum of 3 works can be recovered during the semester (20%); |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | C4 - Improving the performance of software systems<br>• Identifying and describing the defining elements of software system performance<br>• Explaining the interaction of factors that determine the performance of software systems<br>• Design and integration of information systems using technologies and programming environments.<br>C5 - Design, life cycle management, integration and integrity of software systems.<br>• Specifying the relevant criteria regarding the life cycle, quality, safety and interaction of the computer system with the environment and with the human operator<br>• The use of interdisciplinary knowledge for the adaptation of the computer system in relation to the requirements of the field of applications |
| Transversal skills | CT1. Honorable, responsible, ethical conduct in the spirit of the law to ensure the reputation of the profession |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ Development and study of theories, methods and tools necessary for software development<br>▪ Definitions, classifications, terminology as well as models for describing and approaching problems<br>▪ Visibility of processes, professional responsibility<br>▪ The first stages of developing a software project are underway |
| 7.2 Specific objectives | ▪ Adequate use of quality, safety and security standards in information processing<br>▪ Carrying out a small and medium-sized project including problem identification and analysis, design, development and demonstrating an understanding of the need for quality<br>▪ Structural design. Object-oriented design.<br>▪ Forming a correct design style for a software application |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| Chapter 1. Introduction to programming engineering. | Presentation, free discussions | 2 |
| Chapter 2. Socio-technical systems and critical systems. | Presentation, free discussions | 2 |
| Chapter 3. Software processes. | Presentation, free discussions | 2 |
| Chapter 4. Project management. | Presentation, free discussions | 4 |
| Chapter 5. Software requirements. | Presentation, free discussions and report | 4 |
| Chapter 6. Requirements engineering processes. | Presentation, free discussions | 2 |
| Chapter 7. System models in requirements engineering. | Presentation, free discussions and report | 2 |
| Chapter 8. Specifications of critical systems. | Presentation, free discussions | 2 |
| Chapter 9. Formal specifications. | Presentation, free discussions | 2 |
| Chapter 10. Architectural design. | Presentation, free discussions | 2 |
| Chapter 11. Distributed systems architecture | Presentation, free discussions | 2 |
| Chapter 12. Application architecture | Presentation, free discussions. | 2 |
| | | |
| | | |

Bibliography

1. Software Engineering - Ian Sommerville, Editura Addison-Wesley, 2000
2. Software Engineering. Principles and practice - Hans van Vliet, Editura John Wiley & Sons, 2010

| | | |
|---|---|---|
| 3. Software Engineering - modern approaches. - Eric J. Braude, Michael E. Bernstein, Editura John Wiley & Sons, 2008 | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| laboratory | | |
| 1. Introduction to Programming Engineering. Presentation of the requirements at the IP laboratory. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 2. Organizing teams. Models of organization. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 2 |
| 3. UML language | Introductory lecture; free and individual discussions; implementation of proposed programs. | 4 |
| 4. CASE TOOLS | Introductory lecture; free and individual discussions; implementation of proposed programs. | 6 |
| 5. Requirements collection phase. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 6 |
| 6. System specification. | Introductory lecture; free and individual discussions; implementation of proposed programs. | 4 |
| 7. Object-oriented analysis | Introductory lecture; free and individual discussions; implementation of proposed programs. | 4 |
| Bibliography<br>1. Ingineria programarii, indrumator de laborator - I. Mang, R. Gyorodi, Al. Toth, Univ. din Oradea, 2001<br>2. Software Engineering. Principles and practice - Hans van Vliet, Editura John Wiley & Sons, 2010<br>3. Software Engineering - modern approaches. - Eric J. Braude, Michael E. Bernstein, Editura John Wiley & Sons, 2008 | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- Use of specific theories and tools to explain the operation and structure of software systems
- Description of the structure and operation of simple software components
- Explaining the role, interaction and operation of software system components
- The content of the discipline is adapted to the requirements of specialized companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the | Final course evaluation and problem solving. | 40% |

| | | | |
|---|---|---|---|
| | minimum performance standard<br>- For 10: the correct solving of all the subjects at the exam, the presence and activity at courses<br>Activity at classes and essays | Presentation of papers, attendance at courses | 20% |
| 10.5 Academic seminar | Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard<br>- For 10: | | |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard<br>Checking the theoretical preparation for the laboratory class and the way of accomplishing the proposed topics.<br>In order to participate in the exam, it is necessary to perform all the laboratory works and to obtain a grade of 5 for the activity carried out during the semester.<br>- For 10: the presence and activity at laboratory | Weekly evaluation of the laboratory preparation<br>Tracking the activity along the way, practical applications. | 40% |
| 10.7 Project | | | |
| 10.8 Minimum performance standard:<br>Course:<br>Academic seminar:<br>Laboratory:<br>Project:<br>- Carrying out projects respecting ethical and responsible behavior;<br>- To be able to solve small and medium size problems in a POO manner in C ++ and Java.<br>- To know the design methods that are used and the differences between them. | | | |

**Completion date:**

**Date of endorsement in the department:**

**Date of endorsement in the Faculty Board:**

HELPFUL HINTS (*to be erased after completion*):

[1)] Choose one of the followings:
- Department of Control Systems Engineering and Management
- Department of Computers and Information Technology
- Department of Electrical Engineering
- Department of Electronics and Telecommunications

[2)] Choose one of the followings:
- Control systems engineering
- Computers and information technology
- Electrical engineering
- Electronical engineering, telecommunications and information technologies
- Engineering and management

[3)] Choose one of the followings:
- Bachelor (1st cycle)
- Master (2nd cycle)

[4)] Choose one of the followings:
A. Bachelor study programs:
- Applied Electronics
- Automatics and Applied Informatics
- Computers
- Economic Engineering in Electric, Electronic and Energetic Field
- Electrical Engineering and Computers
- Electrical Systems
- Electromechanics
- Electromechanics (at Beius)
- Information Technology
- Networks and Softwares for Telecommunications

B. Master study programs:
- Audio-Video Technologies and Telecommunications
- Advanced Systems in Electrical Engineering
- Management in Information Technology
- Advanced Control Systems
- Management and Communication in Engineering

[5)] Choose one of the followings:
- Bachelor of Engineering
- Master of Science in Engineering

[6)] According to the curriculum

[7)] Choose one of the followings, according to the curriculum:
- Ex. - Examination
- Cv. - Colloquium
- Vp - Continuous Assessment
- Pr - Project
- A/R- Passed/Failed

[8)] Choose one of the followings, according to the curriculum:
A. For Bachelor study programs:
- GD - General Discipline
- FD - Fundamental Discipline

- SD - Specialized Discipline
- CD - Complementary Discipline
- FD - Field Discipline
- DP - Practical Activities
- UO - University Choice

B. For Master study programs:
- THD - Thoroughgoing Disciplines
- SYD - Synthesis Disciplines
- AKD - Advanced Knowledge Disciplines
- UO - University Choice

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | Department of Computers and Information Technology |
| 1.4 Field of study | Computers and information technology |
| 1.5 Study cycle | Bachelor (1st cycle) |
| 1.6 Study program/Qualification | Computers / Bachelor of Engineering |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Object-Oriented Applications Design** | | | | | |
| 2.2 Holder of the subject | | **Prof.univ.dr.ing. Zmaranda Doina** | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | **Prof.univ.dr.ing. Zmaranda Doina** | | | | | |
| 2.4 Year of study | **IV** | 2.5 Semester | **7** | 2.6 Type of the evaluation | **Ex**. - Examination | 2.7 Subject regime | **SD -** Specialized Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | **4** | of which: 3.2 course | **2** | 3.3 academic seminar/laboratory/project | **2** |
| 3.4 Total of hours from the curriculum | **56** | Of which: 3.5 course | **28** | 3.6 academic seminar/laboratory/project | **28** |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 14 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 12 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 6 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **48** |
| **3.9 Total of hours per semester** | **104** |
| **3.10 Number of credits** | **4** |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | (Conditions) |
| 4.2 related to skills | Knowledge of basic concepts of object-oriented programming |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | - the course can be held face to face (classroom equipped with computer and video projector) or online; slide-based presentation<br>- attendance at least 50% of the course |
| 5.2.for the development of the academic seminary/laboratory/project | - the laboratory can be held face to face (laboratory room equipped with computers and .NET platform / Visual Studio) or online<br>- mandatory presence at all laboratories<br>- a maximum of 4 laboratory works can be recovered during the semester (30%)<br>- the frequency of laboratory hours below 70% leads to the re-done the discipline |

| 6. Specific skills acquired | |
|---|---|
| Professional skills | **CP2.** Design of hardware, software and communications components<br><br>**CP5**. Design, life cycle management, integration and integrity of hardware and communications systems |
| Transversal skills | |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ In the context of the diversity of existing software applications, with urgent performance needs, the course addresses specific aspects in the field of design and development of object-oriented applications |
| 7.2 Specific objectives | The course aims to describe the theoretical concepts and principles together with design patterns that underlie the design of object-oriented applications development<br>The laboratory familiarizes students with practical aspects of designing, modeling and implementing object-oriented applications using design patterns and a tool in the field of object analysis and design - UML (Unified Modeling Language). The implementations are based on.NET platform and C# language, without restricting the generality of the presented concepts |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| UML - Unified Modeling Language. UML Model and concepts. | Presentation of the course concepts and examples on slides, face to face or online | 2 |
| Structural and behavioral diagrams in UML model | | 2 |
| Object oriented design with UML. Requirements specification. Object oriented analysis: analysis class diagrams development. | | 2 |
| Object oriented design with UML. Use case and sequence diagram development. Refinement of the model and realization of design class diagrams. Organizing the model. Refactoring | | 2 |
| SOLID design principles. Design patterns - concepts. Classification of design patterns. Applicability of design patterns. Benefits | | 2 |
| Creational patterns: Singleton, Factory, AbstractFactory, Builder, Prototype. | | 2 |
| Examples of creational patterns. | | 2 |
| Structural patterns: Façade, Decorator, Adapter, Bridge, Composite, Flyweight, Proxy. | | 2 |
| Examples of structural patterns. | | 2 |
| Behavioral patterns: Visitor. State. Observer, Command, Strategy, Chain of Responsibility, Interpreter, Iterator, Mediator, Memento, Template. | | 4 |
| Examples of behavioral patterns. | | 4 |
| Architectural patterns: MVC (Model-View-Controller). Repository | | 2 |

**Bibliography**


1. D. Zmaranda - Proiectarea sistemelor orientate pe obiecte utilizând şabloane de proiectare, Editura Universităţii din Oradea,ISBN 978-606-10-0427-0, 332pg., 2011
2. 2. D. Zaharie, D. Zmaranda - Dezvoltarea aplicaţiilor software utilizând platforma .NET, Editura ASE Bucureşti, ISBN 978-606-505-547-6, 506pg., 2012

3. 3. Dathan, Brahma, Ramnath, Sarnath, Object-Oriented Analysis, Design and Implementation, An Integrated Approach, ISBN 978-3-319-24280-4, second edition, University Press, 2015
4. 4. Gary Mclean, Adaptive Code via C#: Agile coding with design patterns and SOLID principles, ISBN-13 : 978-0735683204, Microsoft Press; 1st Edition, 2014
5. 5. Dmitri Nesteruk, Design Patterns in .NET: Reusable Approaches in C# and F# for Object-Oriented Software Design, ISBN-13 : 978-1484243657, Apress; 1st ed. Edition, 2019
6. 6. Jimmy Nilsson, Applying Domain-Driven Design and Patterns: With Examples in C# and .NET, Addison-Wesley, 2006
7. 7. Martin Fowler, UML Distilled: A Brief Guide to the Standard Object Modeling Language (3nd Edition), Addison Wesley – Pearson Education, 2004
8. 8. Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development (3rd Edition) , Prentice Hall, 2004

| 8.2 Academic laboratory | Teaching methods | No. of hours/ Observations |
|---|---|---|
| UML basic concepts. UML diagrams: structural and behavioral diagrams. | Students receive practical homework at least a week in advance, and study it. At the beginning of the laboratory, possible implementation solutions for the proposed applications are discussed. Afterwards, the students start implementations (the proposed problems from each laboratory) under the guidance of the teacher. | 2 |
| Case study: Library application. Object oriented analysis: discussions. Requirements specifications. Conceptual model development | | 2 |
| Case study: Library application. Object oriented design: major subsystem identification, software classes identification and creation | | 4 |
| Case study: Library application. Object oriented implementation: loosely coupling, generic code creation, Façade and Singleton pattern utilization | | 2 |
| Case study: Library application. Extensibility of the solution: refactorization by using Decorator pattern | | 2 |
| Finite State Modeling (Finite State Machine). Case study: controller for microwave. Concepts. | | 2 |
| Case study: controller for microwave. Refactorization - State pattern. | | 4 |
| Case study: controller for microwave. Refactorization - Observer pattern | | 2 |
| Laboratory evaluations and final assessment | | 4 |

Bibliography

1. D. Zmaranda - Proiectarea sistemelor orientate pe obiecte utilizând şabloane de proiectare, Editura Universităţii din Oradea, ISBN 978-606-10-0427-0, 332pg., 2011

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is found in the curriculum of Computers specialization at Politehnica University of Timisoara. Knowledge of the basic concepts of object-oriented modeling and design patterns, presented within this discipline, represent an important requirement in order develop programming skills and abilities that were requested by software companies.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard: it is necessary to know the fundamental concepts required in the quiz, without presenting details on them<br>For 10: correct answer and detailed knowledge to all the questions in the quiz is required | **Written exam** - the assessment can be done face to face or online<br>Students receive for solving a quiz with 4-6 theory questions that tests the mastery of the theoretical concepts presented in the course. | 40 % |
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard: achieving a functional implementation in proportion of 50% of the applications proposed in the laboratory<br>For 10, detailed knowledge of how to implement all laboratory problems and 100% functional implementation is required | **Practical application** - evaluation can be done face to face or online.<br>At each laboratory, students are evaluated based on their activity (answers to questions, implementation proposals, etc.), evaluations that is finalized at the end of the laboratory by a mark for all activity during the semester. | 60 % |

10.8 Minimum performance standard:

Course:

- knowledge and understanding of the basic concepts that are specific to the modeling and design of an object-oriented application as well as the tools / languages used in the field of modeling and object- oriented design
- knowledge and understanding of the general structure of OOP applications and familiarization with design patterns specific to the field

Laboratory:

- acquiring practical skills and learning how to model, design and implement an object-oriented application: fundamental concepts, structuring applications as well as how to apply theoretical concepts in the development process of a concrete application
- practical utilization of modeling and design patterns

**Completion date:** 07.09.2022

**Date of endorsement in the department:** 21.09.2022

**Date of endorsement in the Faculty Board:** 23.09.2022

# SUBJECT DESCRIPTION

**1. Data related to the study program**

| | |
|---|---|
| 1.1 Higher education institution | **UNIVERSITY OF ORADEA** |
| 1.2 Faculty | **Faculty of Electrical Engineering and Information Technology** |
| 1.3 Department | **Computers and Information Technology** |
| 1.4 Field of study | **Computers and information technology** |
| 1.5 Study cycle | **Bachelor (1st cycle)** |
| 1.6 Study program/Qualification | **Information Technology / Bachelor of Engineering** |

**2. Data related to the subject**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the subject | | **Performance evaluation** | | | | | |
| 2.2 Holder of the subject | | Associate professor dr. Elisa Valentina MOISI | | | | | |
| 2.3 Holder of the academic seminar/laboratory/project | | Associate professor dr. Elisa Valentina MOISI | | | | | |
| 2.4 Year of study | IV | 2.5 Semester | 7 | 2.6 Type of the evaluation | Vp - Continuous Assessment | 2.7 Subject regime | SD - Specialized Discipline |

**3. Total estimated time** (hours of didactic activities per semester)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 course | 2 | 3.3 academic seminar/laboratory/project | 2 |
| 3.4 Total of hours from the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 academic seminar/laboratory/project | 28 |

| | |
|---|---|
| Distribution of time | hours |
| Study using the manual, course support, bibliography and handwritten notes | 16 |
| Supplementary documentation using the library, on field-related electronic platforms and in field-related places | 8 |
| Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays | 14 |
| Tutorials | 2 |
| Examinations | 4 |
| Other activities. | |

| | |
|---|---|
| **3.7 Total of hours for individual study** | **44** |
| **3.9 Total of hours per semester** | **100** |
| **3.10 Number of credits** | 4 |

**4. Pre-requisites** (where applicable)

| | |
|---|---|
| 4.1 related to the curriculum | Computer architecture. Microprocessor systems. |
| 4.2 related to skills | Programming logics, average language programming skills |

**5. Conditions** (where applicable)

| | |
|---|---|
| 5.1. for the development of the course | Classroom with laptops and video projector<br>The course can be held face-to-face or online. |

| | |
|---|---|
| 5.2.for the development of the academic seminary/laboratory/project | Laboratory room equipped with networked computers, internet connection and adequate software<br>The laboratory can be carried out face to face or online |

**6. Specific skills acquired**

| | |
|---|---|
| Professional skills | CP3. Solving problems using computer science and engineering instruments<br>CP4. Improving performance of hardware, software and communication systems |
| Transversal skills | CT1. Honorable, responsible and ethical behavior, respecting the spirit of the law, to ensure the reputation of the profession.<br>CT2. Identification, description and implementation of project management processes, by taking different team roles, together with a clear and concise verbal and written description, in Romanian and an international language , of the results of the activity<br>CT3. Demonstration of initiative and action for updating professional, economic knowledge and organizational culture. |

**7. The objectives of the discipline** (resulting from the grid of the specific competences acquired)

| | |
|---|---|
| 7.1 The general objective of the subject | ▪ It aims to provide students with tools and methods for evaluating the performance of computer systems and software |
| 7.2 Specific objectives | ▪ The course aims to acquire by students knowledge specific to the performance of computer systems, both in terms of software and hardware, measurement techniques by measurement, analytical modeling and simulation. Analysis and presentation of data through statistical techniques. It also aims to present some aspects related to software performance. |

**8. Contents***

| 8.1 Course | Teaching methods | No. of hours/ Observations |
|---|---|---|
| 1. Basic concepts and preliminaries. Theory of program testing<br>2. Unit testing<br>3. Control flow testing<br>4. Data flow testing<br>5. Domain testing<br>6. System integration<br>7. System test categories<br>8. Functional testing<br>9. Test generation from fsm models<br>10. System test design<br>11. System test planning and automation<br>12. System test execution<br>13. Acceptance testing<br>14. Software reliabilty | Presentation, description, explanations, examples, dialogue | 28 |

Bibliography

Kshirasagar Naik, Priyadarshi Tripathy, Software Testing and Quality Assurance: Theory and Practice, John Wiley&Sons, 2011
Mauro Pezze and Michal Young., Software Testing and Analysis, 2008, John Wiley & Sons
Mohammad Obaidat, N. Boudriga- Fundamentals of Performance Evaluation of Computer and Telecommunication Systems, John Wiley&Sons, 2010
Cursul - Software Quality and Testing - Greg Gay, https://greg4cr.github.io/courses/spring22dit635/index.html

| | | |
|---|---|---|
| Information Systems Today: Managing the Digital World, Joseph S Valacich, Christoph Schneider, Matthew Hashim, Published by Pearson (May 10th 2021) | | |
| 8.2 Academic seminar/laboratory/project | Teaching methods | No. of hours/ Observations |
| Test-driven development (TDD) with Python<br>**The Basics of TDD and Django**<br>Getting Django Set Up Using a Functional Test<br>Extending Our Functional Test Using the unittest Module<br>Testing a Simple Home Page with Unit Tests<br>What Are We Doing with All These Tests? (And, Refactoring)<br>Saving User Input: Testing the Database<br>Improving Functional Tests: Ensuring Isolation and Removing Voodoo Sleeps<br>Working Incrementally<br>**Web Development Sine Qua Nons**<br>Prettification: Layout and Styling, and What to Test About It<br>Testing Deployment Using a Staging Site<br>Getting to a Production-Ready Deployment<br>Automating Deployment with Fabric<br>Splitting Our Tests into Multiple Files, and a Generic Wait Helper<br>Validation at the Database Layer<br>A Simple Form<br>More Advanced Forms<br>Dipping Our Toes, Very Tentatively, into JavaScript<br>Deploying Our New Code<br>**More Advanced Topics in Testing**<br>User Authentication, Spiking, and De-Spiking<br>Using Mocks to Test External Dependencies or Reduce Duplication<br>Test Fixtures and a Decorator for Explicit Waits<br>Server-Side Debugging<br>Finishing "My Lists": Outside-In TDD<br>Test Isolation, and "Listening to Your Tests"<br>Continuous Integration (CI)<br>The Token Social Bit, the Page Pattern, and an Exercise for the Reader<br>Fast Tests, Slow Tests, and Hot Lava | Participatory laboratory, students writing code, group work, dialogue, demonstration, questions, functionality testing | 28 |
| Bibliography<br>Test-Driven Development with Python, 2nd Edition, by Harry Percival, Released August 2017, Publisher(s): O'Reilly Media, Inc., ISBN: 9781491958704<br>Kshirasagar Naik, Priyadarshi Tripathy, Software Testing and Quality Assurance: Theory and Practice, John Wiley&Sons, 2011<br>Mauro Pezze and Michal Young., Software Testing and Analysis, 2008, John Wiley & Sons<br>Mohammad Obaidat, N. Boudriga- Fundamentals of Performance Evaluation of Computer and Telecommunication Systems, John Wiley&Sons, 2010<br>Cursul - Software Quality and Testing - Greg Gay, https://greg4cr.github.io/courses/spring22dit635/index.html | | |

**9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program**

- The content of the discipline is consistent with what is done in other university centers abroad.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Percent from the final mark |
|---|---|---|---|
| 10.4 Course | Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard | Written paper | 50% |
| 10.5 Academic seminar | | | |

| | | | |
|---|---|---|---|
| 10.6 Laboratory | Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard | - Laboratory / practical works<br>- Tests during the semester | 50% |
| 10.7 Project | | | |

10.8 Minimum performance standard:

Course:

1. To solve well a minimum of topics -questions and applications
2. Minimum grade 5 in the laboratory

Academic seminar: -

Laboratory:

1. The student knows the main concepts, recognizes them, defines them correctly and builds a simple application;
   2. The programming language is used correctly;
   3. To solve well a minimum of topics -questions and applications

Project: -

**Completion date: 07.09.2022**

**Date of endorsement in the department: 21.09.2022**

**Date of endorsement in the Faculty Board: 23.09.2022**