# Syllabus

## 1. Data about the program of study

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| 1.1 Institution | Technical University of Cluj-Napoca |
| 1.2 Faculty | Automation and Computer Science |
| 1.3 Departament | Automation |
| 1.4 Field of study | Automation. Applied Informatics and Intelligent Systems |
| 1.5 Cycle of study | Bachelor of Science |
| 1.6 Program of study/Qualification | Automation and Applied Informatics (English) |
| 1.7 Form of education | Full time |
| 1.8 Codul disciplinei | 12 |

## 2. Data about the subject

| 2.1 Subject name | | *Applied Informatics* | |
|---|---|---|---|
| 2.2 Course responsible/lecturer | | Prof.dr.ing. Honoriu VĂLEAN – Honoriu.Valean@aut.utcluj.ro | |
| 2.3 Teachers in charge of applications | | Conf.dr.ing. Dan GOȚA – Dan.Gota@aut.utcluj.ro<br>As.dr.ing. Claudiu DOMUTA – Claudiu.Domuta@aut.utcluj.ro<br>As.drd.ing. Alexandru CIOBOTARU – Alexandru.Ciobotaru@aut.utcluj.ro | |
| 2.4 Year of study | 3 | 2.5 Semester | 2 | 2.6 Assessment *(E/C/V)* | E |
| 2.7 Type of subject | *DF – fundamental, DD – in the field, DS – specialty, DC – complementary* | DS |
| | *DI – compulsory, DO – elective, Dfac – optional* | DI |

## 3. Estimated total time

| 3.1 Number of hours per week | 3 | of which: | Course | 2 | Seminar | 0 | Laboratory | 2 | Project | 0 |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.2 Number of hours per semester | 56 | of which: | course | 28 | Seminar | 0 | Laboratory | 28 | Project | 0 |

| 3.3 Individual study | |
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| (a) Manual, lecture material and notes, bibliography | 6 |
| (b) Supplementary study in the library, online and in the field | 6 |
| (c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays | 3 |
| (d) Tutoring | |
| (e) Exams and tests | 4 |
| (f) Other activities: | |

| | | |
|---|---|---|
| 3.4 Total hours of individual study (sum of (3.3(a)…3.3(f))) | 19 | |
| 3.5 Total hours per semester (3.2+3.4) | 75 | |
| 3.6 Number of credit points | 3 | |

## 4. Pre-requisites (where appropriate)

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| 4.1 Curriculum | Computer programming |
| 4.2 Competence | Operating with fundamental concepts in computer science, information and communication technology |

## 5. Requirements (where appropriate)

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| 5.1. For the course | Amphiteater with projector and internet access |
| 5.2. For the applications | Laboratory equipped with computer network - C ++ programming environment (Visual Studio), internet access, projector, blackboard |

## 6. Specific competences

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| 6.1 Professional competences | **C2**<br>Operating with basic concepts of computer science, information technology and communication<br>**C2.2**<br>Well grounded usage of concepts from informatics and computer technology in solving well defined problems of system engineering and in applications requiring the use of hardware or software in industrial systems or information technology systems. |

| | **C2.3**<br>Solving common problems of systems engineering using the computer science and information technology concepts for the use of dedicated software tools and computer aided design (CAD) and for the adaptation and extension of these.<br>**C4**<br>Design, implementation, testing, operation and maintenance of systems with generic and dedicated equipments, including computer networks for control engineering and applied informatics.<br>**C4.1**<br>Defining the requirements of applicable standards and of the methods of implementation, testing, operation and maintenance for the equipments ùsed in the applications of automatic control and applied informatics based on on the operation and design principles<br>**C4.2**<br>Defining the requirements of applicable standards and of the methods of implementation, testing, operation and maintenance for the equipments ùsed in the applications of automatic control and applied informatics based on on the operation and design principles. |
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| 6.2 Cross competences | |

## 7. Course objectives

| 7.1 General objective | Development of the theoretical and practical skills necessary for the analysis, design, implementation and testing of average complexity applications in C ++ and C # languages, using the OOP paradigm |
|---|---|
| 7.2 Specific objectives | Understanding the paradigm of object-oriented programming.<br>Development of theoretical and practical skills for writing average complexity applications in C ++ and C # languages.<br>Understanding how object-oriented programming knowledge can be used in modern programming environments; case study for windows programming. |

## 8. Contents

| 8.1 Lecture | No.hours | Teaching methods | Notes |
|---|---|---|---|
| The paradigm of object-oriented programming. OOP utility. | 2 | Teaching using laptop and projector, interactive course, debate / or online on Teams platform | |
| Difference between structure and class. Encapsulation. Levels of protection. | 2 | | |
| Constructors, destructors. Dynamic allocation, copy constructors. | 2 | | |
| Operators overloading. Functions. Friend functions. | 2 | | |
| Inheritance. Simple, multiple, public, private inheritance. | 2 | | |
| Polymorphism. Methods overloading. Virtual methods. Abstract methods. | 2 | | |
| Template | 2 | | |
| C# programming language. | 2 | | |
| OOP in C#. Comparison with C++. Inheritance. | 4 | | |
| Polymorphism in C#. Abstract classes. Interfaces. | 2 | | |
| Generics. | 2 | | |
| Graphic programming under Windows. Writing simple programs. | 2 | | |
| Graphic programming in OOP context. | 2 | | |
| Bibliography<br>1.  J. Liberty. C++ unleashed. Sams. Pub., ISBN 0672312395, 1999<br>2.  H. Valean, L. Miclea, M.Damian. Introducere in Visual C++. Ed. U.T. Pres, 2005, 290 pag, ISBN 973-662-154-5<br>3.  K.U. Subhash. Object Oriented Programming with C++. Pearson Education, ISBN 8131733297, 2010<br>4.  P.B. Kotur. Object Oriented Programming with C++. Sapna Book House, ISBN 978-81-280-1853-4, 2012 | | | |
| 8.2 Aplications (seminar/laboratory/project) | No.hours | Teaching methods | Notes |
| The paradigm of object-oriented programming. OOP utility. | 2 | Presentation of examples, | Mandatory attendance |
| Difference between structure and class. Encapsulation. Levels of | 2 | | |

| | | |
|---|---|---|
| protection. | | demonstrations, discussions, practical applications / or online on Teams platform |
| Constructors, destructors. Dynamic allocation, copy constructors. | 2 | |
| Operators overloading. Functions. Friend functions. | 2 | |
| Inheritance. Simple, multiple, public, private inheritance. | 2 | |
| Polymorphism. Methods overloading. Virtual methods. Abstract methods. | 2 | |
| Template | 2 | |
| C# programming language. | 2 | |
| OOP in C#. Comparison with C++. Inheritance. | 2 | |
| Polymorphism in C#. Abstract classes. Interfaces. | 2 | |
| Generics. | 2 | |
| Graphic programming under Windows. Writing simple programs. | 2 | |
| Graphic programming in OOP context. | 2 | |
| The paradigm of object-oriented programming. OOP utility. | 2 | |
| Assessment | 2 | |

Bibliography
1. J. Liberty. C++ unleashed. Sams. Pub., ISBN 0672312395, 1999
2. H. Valean, L. Miclea, M.Damian. Introducere in Visual C++. Ed. U.T. Pres, 2005, 290 pag, ISBN 973-662-154-5
3. K.U. Subhash. Object Oriented Programming with C++. Pearson Education, ISBN 8131733297, 2010
4. P.B. Kotur. Object Oriented Programming with C++. Sapna Book House, ISBN 978-81-280-1853-4, 2012

**9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field**

The content of the discipline, together with the skills and abilities acquired, correspond to the expectations of the professional organizations of profile, the companies of profile, as well as of the national and international bodies of quality assurance (ARACIS). It also ensures the adoption of ethical standards appropriate to the engineering practice

**10. Evaluation**

| Activity type | Assessment criteria | Assessment methods | Weight in the final grade |
|---|---|---|---|
| Course | Assessment of knowledge through a test based on the knowledge gained following participation in the course | Written exam / online exam using Teams | 50% |
| Seminar | | | |
| Laboratory | Examination of the skills and knowledge acquired through the participation in the laboratory. | Practical assessment / online assesment using Teams | 50% |
| Project | | | |
| Minimum standard of performance: Written exam rabk > 5 and practical assessment rank > 5 and practical presentation rank > 5 | | | |

| Date of filling in: 3.02.2025 | | Title Firstname NAME | Signature |
|---|---|---|---|
| | Course | Prof.dr.ing. Honoriu VĂLEAN | |
| | Aplications | Conf.dr.ing. Dan GOȚA | |
| | | SL.dr.ing. Claudiu DOMUȚA | |
| | | As.drd.ing. Alexandru CIOBOTARU | |
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| Date of approval by the Department Board | Head of Departament<br>Prof.dr.ing. Honoriu VĂLEAN |
| Date of approval by the Faculty Council | Dean<br>Prof.dr.ing. Vlad MUREȘAN |