# SYLLABUS

## 1. Program Information

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| 1.1 Higher education institution | Technical University of Cluj-Napoca |
| 1.2 Faculty | Faculty of Automation and Computer Science |
| 1.3 Department | Department of Automation |
| 1.4 Field of study | Automation, Applied Informatics and Intelligent Systems |
| 1.5 Cycle of studies | Bachelor |
| 1.6 Study Programme/Qualification | Intelligent Automation Systems (dual, in English language) |
| 1.7 Form of education | IF – full-time education |
| 1.8 Course code | 21.00 |

## 2. Course information

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|---|---|---|---|---|---|---|
| 2.1 Course title | | | | **Digital Transformation** | | |
| 2.2 Course lecturer | | | | | | |
| 2.3 Seminar / Laboratory / Project Lecturer | | | | *Ing. Raluca Andrei (Emerson)*<br>*Dr.Ing. Alin Dorin Burz (Emerson)* | | |
| 2.4 Year of study | 2 | 2.5 Semester | 1 | 2.6 Type of assessment | | |
| 2.7 Course status | Formative category *(DF, DS, DC)* | | | | | DS |
| | Optionality *(DOB, DOP, DFac)* | | | | | DOB |

## 3.Total estimated time

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: | HEI | Lecture | 0 | Seminar | 0 | Laboratory | 0 | Project | 0 |
| | | | CO | | 0 | | 0 | | 0 | | 4 |
| 3.2 Number of hours per semester | 56 | of which: | HEI | Lecture | 0 | Seminar | 0 | Laboratory | 0 | Project | 0 |
| | | | CO | | 0 | | 0 | | 0 | | 56 |

| 3.3 Distribution of time allocation (hours per semester) for: | HEI | CO |
|---|---|---|
| (a) Study based on textbook, course support, bibliography, and notes | 0 | 8 |
| (b) Additional documentation in library, specialized electronic platforms, and fieldwork | 0 | 2 |
| (c) Preparation of seminars/laboratories, assignments, papers, portfolios and essays | 0 | 5 |
| (d) Tutoring | 0 | 1 |
| (e) Examinations | 0 | 3 |
| (f) Other activities: | 0 | 0 |
| 3.4 Total individual study hours (sum (3.3(a)... 3.3(f))) | 0 | 19 |
| 3.5 Total hours per semester (3.2+3.4) | 0 | 75 |
| 3.6 Number of credits per semester | 0 | 5 |

*(HEI = Higher Education Institution, CO = Company)*

## 4. Prerequisites (where applicable)

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| 4.1 Curriculum Prerequisites | • Industrial Automation Platforms |
| 4.2 Competency Prerequisites | • Ability to independently explore technical documentation, troubleshoot problems, and manage project tasks.<br>• Ability to solve configuration tasks. Understand and apply control strategies using DCS systems. |

## 5. Conditions (where applicable)

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| 5.1. Course Organization Conditions | NA |
| 5.2. Seminar / Laboratory / Project organization conditions | • Computer, Specific software |

**6. Specific Competencies Acquired**

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| Professional Competencies | • PC01 Adjust engineering designs<br>• PC02 Analyse test data<br>• PC06 Define technical requirements<br>• PC08 Design automation components<br>• PC12 Gather technical information<br>• PC13 Interact professionally in research and professional environments<br>• PC21 Report analysis results<br>• PC26 Use information technology tools<br>• PC30 Design control systems |
| Transversal Competencies | • TC01 Apply knowledge of science, technology and engineering<br>• TC03 Demonstrate responsability<br>• TC04 Work in teams<br>• TC05 Interpret mathematical information |

**7. Learning outcomes**

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| Knowledge: | • Know DCS approach for digital transformation.<br>• Know key benefits of DCS. |
| Skills: | • Program digital and analog devices using Ovation control builder.<br>• Create graphical macros using Graphics builder.<br>• Configure Control Modules and realize bulk edit.<br>• Configure HMI in DeltaV. |
| Responsibility and autonomy: | • Take initiative in analyzing technical specification and proposing solutions.<br>• Collaborate in a team responsible for project implementation.<br>• Demonstrate responsible use of Ovation/DeltaV applications. |

**8. Course Objectives**

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| 8.1 General objective of the course | • This course provides a comprehensive understanding of DCS control strategies, fundamentals and configuration principles, with a specialized focus on DeltaV and Ovation.<br>• Students will learn about the significance of testing and validation processes in project deliveries. |
| 8.2 Specific objectives | • Learn to configure control module classes and analog inputs effectively.<br>• Master configuration techniques for motors within the PCSD Library framework.<br>• Develop proficiency in PID control loop setup and adjustments.<br>• Explore practical applications of Bulk Edit in various scenarios.<br>• Learn principles and general guidelines for effective HMI graphics design.<br>• Create control and device sheets using Ovation Developer Studio.<br>• Develop logical sequences and conduct simulations effectively.<br>• Learn to interpret signal diagrams and analyze point information.<br>• Utilize system viewer for comprehensive system analysis. |

**9. Contents**

| 9.1 Lectures | No. of hours | | Teaching methods | Obs. |
|---|---|---|---|---|
| 9.2 Seminar / laboratory / project | Hours HEI | Hours CO | Teaching methods | Obs. |

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|---|---|---|---|---|
| 1. Overview of project organization structures. Steps in project planning. Industry standards and best practices for project management. Introduction to Emerson Tools. | 0 | 4 | Presentation of examples, description of software programming environments, additional explanations, exercises, discussions | |
| 2. Overview of the PCSD Library. Importance and benefits of using the PCSD Library. Control Module Classes. Analog Input configuration. | 0 | 4 | | |
| 3. PCSD Library. Motor, PID control loops configuration. | 0 | 4 | | |
| 4. Introduction to Bulk Edit. General concepts and applications. | 0 | 4 | | |
| 5. Human Machine Interface. P&ID fundementals. Importance of DCS Graphics | 0 | 4 | | |
| 6. Human Machine Interface. Graphics principles and general guidelines. Quality Management. Key principles and practices of quality management. | 0 | 4 | | |
| 7. Test Deliverables. Importance of thorough testing and validation. | 0 | 4 | | |
| 8. Ovation Developer Studio. Create control sheets, device sheets, logic and simulation. | 0 | 4 | | |
| 9. Building logic and implementing control strategies using Ovation Control Builder. | 0 | 4 | | |
| 10. Ovation applications. Signal Diagram. Point information. System viewer. | 0 | 4 | | |
| 11. Graphic builder. Creating HMI Graphics. | 0 | 4 | | |
| 12. Templating. Typicals (devices, input signal processing, PID loops). Graphics Macros and Pop-ups | 0 | 4 | | |
| 13. High-performance HMI. | 0 | 4 | | |
| 14. General approach of projects implementation | 0 | 4 | | |
| Bibliography<br>1. OVMAN60-Developer Studio User Guide<br>2. OVMAN80-Control Builder User Guide<br>3. OVMAN90-Graphics Builder User Guide<br>4. PCSD Books Online-DeltaV<br>5. PAS001-Engineering Level 1 | | | | |

**10. Correlation of course content with the expectations of the epistemic community representatives, professional associations, and major employers in the field related to the program**

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| The course content is aligned with DCS industry standards and guidelines, ensuring that students acquire skills relevant for professional certification and meet industry benchmarks. |

**11. Evaluation**

| Activity Type | Evaluation criteria | Evaluation methods | Weight in final grade |
|---|---|---|---|
| 11.1 Lecture | NA | NA | NA |
| 11.2 Seminar/ Laboratory/Project | Practical execution skills, conceptual explanation, troubleshooting and debugging, use of tools and commands | Practical applications | 100% |
| 11.3 Minimum Performance Standard | | | |
| 5 points out of 10 | | | |

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|---|---|---|---|
| Date of completion: 11.05.2025 | Program responsible | Conf.dr.ing. Roxana Rusu-Both | |

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| Date of approval by the Department of Automation Council<br>24.11.2025<br><br>Date of approval by the Faculty of Automation and Computer Science Council<br>28.11.2025 | Director of the Department of Automation<br>Prof.dr.ing. Honoriu VĂLEAN<br><br>Dean<br>Prof.dr.ing. Vlad MUREȘAN |