SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automation and Computer Science
1.3	Department	Computer Science
1.4	Field of study	Computer Science and Information Technology
1.5	Cycle of study	Master of Science
1.6	Program of study/Qualification	Artificial Intelligence and Vision
1.7	Form of education	Full time
1.8	Subject code	8.2

2. Data about the subject

2.1	Subject name			***Industrial Informatics***			
2.2	Subject area			Computers			
2.2	Course responsible/lecturer			Prof. Dr. Eng. Gheorghe Sebestyen			
2.3	Teachers in charge of seminars			Prof. Dr. Eng. Gheorghe Sebestyen			
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	E–**e**xam, C–**c**olloq., V-**v**erif.		E
2.7 Subject category	Formative category: DA – advanced, DS – speciality, DC – complementary						DA
	Optionality: DI – imposed, DO – optional (alternative), DF – optional (free choice)						DO

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laborator	0	3.3 Proiect	0
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laborator	0	3.6 Proiect	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	30
(b) Supplementary study in the library, online and in the field	15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	11
(d) Tutoring	
(e) Exams and tests	2
(f) Other activities	
3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	N.A.
4.2	Competence	N. A.

5. Requirements (where appropriate)

5.1	For the course	Projector, blackboard, computer
5.2	For the applications	Projector, blackboard, computer

6. Specific competences

Professional competences	**C2 -** Development of advanced techniques, methods, and methodologies in the field of software design, software environments and systems and their applications **C2.1 -** Identification and description of the structure and functioning of complex software systems and applications developed on their basis **C2.2 -** Exploitation of specialized knowledge in order to identify, understand and functional and non-functional characteristics, of quality, security and performance, of the latest advanced systems of programs reported in the specialized scientific literature **C2.3 -** Building original software components of advanced program systems, using algorithms, techniques, design methods, methodologies, protocols, programming languages, data structures, technologies and complex programming environments, reported in the literature **C2.4 -** Use of methods, criteria and metrics for evaluation and selection of methodologies for the realization of software systems, their functional and non-functional characteristics **C2.5 -** Elaboration of original software projects, their implementation, testing and validation based on the innovative combination of those reported in the specialized literature **C3 -** Specification, analysis, modeling, design, verification, testing, validation, and maintenance of advanced software systems and software components, using industry-specific tools **C3.1 -** Demonstration of knowledge of technologies, programming environments, CASE software development tools and complex program system concepts **C3.2 -** Analysis and explanation of the role, interactions and functioning of the software components developed on the basis of the latest methodologies for the realization of complex software systems proposed in the scientific literature **C3.3 -** Innovative analysis, modeling and design of computer systems and computer applications, related hardware and software components **C3.4 -** Comparative evaluation, synthetic, including experimental, of solution alternatives for performance optimization, based on usability criteria **C3.5 -** Development and implementation of original software solutions for domain-specific problems, starting from a set of specified informal requirements **C4 -** Contextual integration and integrity of complex software systems **C4.1 -** Demonstration of knowledge and understanding of the interoperability and integration elements specific to software systems, taken both as a whole and by modules **C4.2 -** Using interdisciplinary knowledge to adapt complex software systems in relation to the dynamic requirements of the application field **C4.3 -** Combined use of classical and original principles and methods for component integration, ensuring security, encryption, safety and ease of operation of complex program systems **C4.4 -** Use of quality, safety and security standards in information processing and integration of complex software systems • **C4.5** - Realization of interdisciplinary projects, including problem identification and analysis, specification development, software design, implementation of functional testing and evaluation of specific quality, security and performance criteria, as well as validation of the integrated software system.
Cross competences	NA

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of competencies and skills for designing and implementing control systems based on digital technologies
7.2	Specific objectives	Acquiring knowledge and skills for: design of dedicated and encapsulated microprocessor systems (embedded) digital signal processing design of means of communication specific to the industrial environment designing simple, hierarchical and distributed control systems

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction to industrial informatics – short history, basic concepts	2	Lecture, Discussing Specific Concepts	
Internet of Things (IoT), Internet of Industrial Objects (IioT), cyber-physical systems	2		
Computational models for control systems: IoT, fog and edge computing	2		
Communication in control systems – standards, protocols, design problems	2		
Sensory networks – examples of implementation, routing algorithms, information fusion	2		
Distributed control systems – design principles, examples of experimental models, model based on distributed services	2		
Real-time control of processes – planning strategies and algorithms, techniques for evaluating the response time in the most unfavourable case	2		
Dedicated and encapsulated computing systems	2		
Building automation	2		
Industrial information systems	2		
Digital signal processing – basic, transformed concepts	2		
Digital Signal Processing – Transformed into Z	2		
Numerical filters – design and implementation	2		
Conclusions regarding the use of the calculation technique in the tracking and control of processes	2		
Bibliography *(minimum bibliography of the subject containing at least one reference bibliographic work of the subject, which exists at the disposal of students in an appropriate number of copies)* 1. G. Sebestyen "Informatica industriala", Ed. Albastra, Cluj-Napoca, 2006 2. D. Gorgan, G. Sebestyen, "Designing computers", Blue Publishing House, 2005			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Sensor networks	2	Presentations, Specific experiments, Discussion	
Building automation	2		
Real-time systems	2		
Quality control and traceability	2		
Industrial networks	2		
Adaptive regulators	2		
Bibliography *(minimum bibliography of the subject containing at least one reference bibliographic work of the subject, which exists at the disposal of students in an appropriate number of copies)* 1. G. Sebestyen "Informatica industriala", Ed. Albastra, Cluj-Napoca, 2006 2. D. Gorgan, G. Sebestyen, "Designing computers", Blue Publishing House, 2005			

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

The course is in line with the latest design methodologies used in the profile companies.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Evaluation of theoretical	Written exam	70%

	knowledge		
10.5 Seminars /Laboratory/Project	Evaluation of practical skills (at seminar presentations)	Evaluation of seminar presentations	30%
10.6 Minimum standard of performance			
Minimum 5 at written exam and evakuation of seminar presentation			

Date of filling in:		**Title Surname Name**	**Signature**
	Lecturer	Prof. dr. eng. Gheorghe Sebestyen	
	Teachers in charge of application	Prof. dr. eng. Gheorghe Sebestyen	

Date of approval in the department 20.02.2024	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the faculty council 22.02.2024	Dean Prof.dr.ing. Mihaela Dinsoreanu