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	Automation
1.4 Field of study	System's Engineering
1.5 Cycle of study	Master
1.6 Program of study / Qualification	CYBER PHYSICAL SYSTEMS
1.7 Form of education	Full time

2. Data about the subject

2.1 Subject name	***IoT for Home Automation***			Subject code	**16.20**
2.2 Course responsible / lecturer	Sl. Dr. Ing. Ioan Valentin Sita – valentin.sita@aut.uctluj.ro				
2.3 Teachers in charge of seminars / Laboratory / project	Sl. Dr. Ing. Ioan Valentin Sita – valentin.sita@aut.uctluj.ro				
2.4 Year of study	2	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V – verification)	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:	Course	2	Seminars		Laboratory	1	Project	
3.2 Number of hours per semester	42	of which:	Course	28	Seminars		Laboratory	14	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										23
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10
(d) Tutoring										2
(e) Exams and tests										3
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	58
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Control Engineering, Computer Networks, Industrial Informatics
4.2 Competence	Fundamental knowledge of automation

5. Requirements (where appropriate)

5.1. For the course	Bibliography reading for lectures
5.2. For the applications	Laboratory classes are compulsory

6. Specific competence

6.1 Professional competences	• Interacts professionally in research and professional environments • Applies the principles of scientific ethics and integrity in research activities • Conducts interdisciplinary research • Conducts literature research • Conduct scientific research • Operates scientific and laboratory research equipment • Presents analysis results • Performs data analysis • Writes scientific and academic papers and technical documentation • Develop scientific publications • Synthesizes information
6.2 Cross competences	• Think analytically • Apply scientific, technological, and engineering knowledge

7. Expected Learning Outcomes

Knowledge	The student will know • advanced concepts, principles, and methodologies in systems engineering, automation, and cyber-physical systems • principles of design, operation, and evaluation for complex control systems, industrial networks, and related hardware and software components • modeling and simulation methods for control systems, including how to develop and analyze dynamic models of industrial and cyber-physical systems • interdisciplinary concepts from mathematics, signal processing, automation, control theory, and computer science applicable to the design and optimization of complex systems
Skills	The student will be able to • design, develop, simulate, and implement hardware, software, and control applications for industrial and cyber-physical systems • analyze technical data, evaluate alternatives, and apply problem-solving strategies to complex engineering challenges • integrate multidisciplinary knowledge to design, optimize, implement, and evaluate innovative solutions for complex control systems and industrial networks
Responsibilities and autonomy	• The student will be responsible for carrying out professional or research projects in compliance with quality, safety, and security standard • The student will be responsible for ensuring ethical conduct, academic integrity, and proper management of research and experimental data

8. Discipline objective (as results from the *key competences gained*)

8.1 General objective	Acquiring knowledge in design, programming and use in practical applications of Internet of Things technology for home buildings.
8.2 Specific objectives	• Modelling systems for Internet of Things technology for home buildings. • Structures and algorithms for automatic control systems for home automation. • Designing, implementing and home automation systems programming. • Applications in research, domestic and IoT field.

9. Contents

9.1 Lectures	Hours	Teaching methods	Notes
Introduction to the Internet of Things	2	PPT presentations, open discussions,	In case of major force classes will
Internet of Things architectures, protocols and standards	2		
IoT systems design	2		

Principles of implementation of IoT systems	2	demonstration, case studies	be held online using Teams
IoT systems integration	2		
Interoperability of IoT systems	2		
Redundancy of IoT systems	2		
Introduction to home automation	2		
Monitoring and control systems for home automation	2		
Standards used in implementing installations	2		
Communication Technologies used in building automation	2		
Design systems for home automation	2		
The implementation of home automation systems with IoT equipment	2		
Applications - presentation of case studies	2		

Bibliography:

- Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, Internet of Things: Architectures, Protocols and Standards, Wiley, November 2018, pp.408, ISBN: 978-1-119-35967-8
- Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, November 2013, pp.336, ISBN: 978-1-118-43065-1
- Serpanos Dimitrios, Internet-Of-Things (Iot) Systems: Architectures, Algorithms, Methodologies, Springer, 2019, pp.95, ISBN: 978-3-319-88828-6
- B.K. Tripathy, J. Anuradha Internet of Things (IoT) Technologies, Applications, Challenges and Solutions, CRC Press - Taylor & Francis Group, 2017, pp.376, ISBN: 978-1-138-03500-3
- Hu Fei, Security and Privacy in Internet of Things (IoTs) Models, Algorithms, and Implementations, Taylor and Francis Inc, 2016, pp.592, ISBN: 978-1-498-72318-3
- Vlasios Tsiatsis, Stamatis Karnouskos, Jan Holler, David Boyle, Catherine Mulligan, Internet of Things, 2nd Edition - November 2018, Elsevier, ISBN: 978-0-128-14435-0
- S. Wang, Intelligent Buildings and Building Automation, New York: Taylor & Francis, 2009.
- H. Merz, T. Hansemann, and C. Hübner, Building Automation: Communication Systems with EIB KNX, LON und BACnet: Springer, 2009.
- P. K. Soori, and M. Vishwas, “Lighting Control Strategy for Energy Efficient Office Lighting System Design,” Energy and Buildings, 2013.
- L. Wang, S. Greenberg, J. Fiegel et al., “Monitoring-based HVAC commissioning of an existing office building for energy efficiency,” Applied Energy, 2012.

9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Internet of Things architectures, protocols and standards	2	Presentation of examples, demonstrations, discussions, practical applications	In case of major force classes will be held online using Teams
IoT systems design	2		
Implementation of IoT systems	2		
IoT systems integration, interoperability and redundancy	2		
Monitoring and control systems for home automation	2		
Design systems for home automation	2		
The implementation of home automation systems with IoT equipment	2		

Bibliography

- Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, Internet of Things: Architectures, Protocols and Standards, Wiley, November 2018, pp.408, ISBN: 978-1-119-35967-8
- Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, November 2013, pp.336, ISBN: 978-1-118-43065-1
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- L. Wang, S. Greenberg, J. Fiegel et al., "Monitoring-based HVAC commissioning of an existing office building for energy efficiency," Applied Energy, 2012.

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

The topics of the courses cover the requirements of employers in the field of ICT, especially those in the field of systems engineering. Some of the methods applied within the discipline can also be used in other fields.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Evaluation of the acquired skills, activity within lectures	Written exam (research project)	50%
Seminar	-		
Laboratory	Evaluation of the practical skills, attendance, activity within laboratory classes	Oral exam	50%
Project	-		
Minimum standard of performance: Exam grade >5, Laboratory grade>5			

Date of filling in: 05.07.2026	**Responsible**	**Title First name Last name**	**Signature**
	Course	SL. Dr. Ing. Ioan Valentin Sita	
	Applications	SL. Dr. Ing. Ioan Valentin Sita	

Date of approval in the department of Automation _____	Head of department, Prof.dr.eng. Honoriu VĂLEAN
Date of approval in the Faculty of Automation and Computer Science Council _____	Dean, Prof.dr.eng. Vlad MUREȘAN