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	Systems Engineering
1.5	Cycle of study	Bachelor of Science (Research Masters)
1.6	Program of study/Qualification	Cyber Physical Systems
1.7	Form of education	Full time
1.8	Subject code	16.20

2. Data about the subject

2.1	Subject name	IoT for Home Automation		
2.2	Subject area	Internet of Things and Home Automation		
2.2	Course responsible/lecturer	Lecturer Dr. Eng. Ioan Valentin Sita – Valentin.Sita@aut.utcluj.ro		
2.3	Teachers in charge of seminars	Lecturer Dr. Eng. Ioan Valentin Sita – Valentin.Sita@aut.utcluj.ro		
2.4 Year of study	2	2.5 Semester 1	2.6 Assessment	(E – exam, C – colloquium, V – verification)	E
2.7 Subject category		Formative category (DF – fundamental, DD – in the field, DS – specialty, DC – complementary)		DA
		Optionality (DI – compulsory, DO – elective, Dfac – optional)		DO

3. Estimated total time

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

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	20
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	23
(d) Tutoring	2
(e) Exams and tests	3
(f) Other activities	0

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	Control Engineering, Systems Theory, Process Modeling, Computer Networks, Industrial Informatics

4.2	Competence	Solve common problems in systems engineering by identifying the techniques, principles, and applying appropriate methods of mathematics with emphasis on numerical calculation methods.

5.   Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	Mandatory attendance

6.   Specific competences

Professional competences	Using mathematics fundamentals, methods of modeling, simulation, identification and analysis processes, computer aided design techniques.
Cross competences	N/A

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

7.1	General objective	Acquiring knowledge in design, programming and use in practical applications of Internet of Things technology for home buildings.
7.2	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.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction to the Internet of Things	2	Teaching using laptop and projector, interactive course, debate / or online on Teams platform	In case of force majeure event, the courses will be held online on
Internet of Things architectures, protocols and standards	2		
IoT systems design	2		
Principles of implementation of IoT systems	2		
IoT systems integration	2		
Interoperability of IoT systems	2		
Redundancy of IoT systems	2		

			the Teams platform
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

[1] 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

[2] Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, November 2013, pp.336, ISBN: 978-1-118-43065-1

[3] Serpanos Dimitrios, Internet-Of-Things (Iot) Systems: Architectures, Algorithms, Methodologies, Springer, 2019, pp.95, ISBN: 978-3-319-88828-6

[4] 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

[5] 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

[6] Vlasios Tsiatsis, Stamatis Karnouskos, Jan Holler, David Boyle, Catherine Mulligan, Internet of Things, 2nd Edition - November 2018, Elsevier, ISBN: 978-0-128-14435-0

[7] S. Wang, Intelligent Buildings and Building Automation, New York: Taylor & Francis, 2009.

[8] H. Merz, T. Hansemann, and C. Hübner, Building Automation: Communication Systems with EIB KNX, LON und BACnet: Springer, 2009.

[9] P. K. Soori, and M. Vishwas, "Lighting Control Strategy for Energy Efficient Office Lighting System Design," Energy and Buildings, 2013.

[10] L. Wang, S. Greenberg, J. Fiegel et al., "Monitoring-based HVAC commissioning of an existing office building for energy efficiency," Applied Energy, 2012.

8.2. Laboratory	Number of hours	Teaching methods	Notes
Internet of Things architectures, protocols and standards	2	Presentation of examples, demonstrations, discussions, practical applications / or online on Teams platform	In case of force majeure event, the applications will be held online on the Teams platform
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

[1] 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
[2] Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, November 2013, pp.336, ISBN: 978-1-118-43065-1

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[9] P. K. Soori, and M. Vishwas, "Lighting Control Strategy for Energy Efficient Office Lighting System Design," Energy and Buildings, 2013.

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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	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Assessment of knowledge through a test based on the knowledge gained following participation in the course	Written exam / online exam using Teams	30%
10.5 Laboratory	Project presentation	Practical presentation or online presentation using Teams	70%
10.6 Minimum standard of performance: Written exam rank > 5 and practical presentation rank > 5			

Date of filling in: 16.03.2023.		Title Surname Name	Signature
	Lecturer	Lecturer Dr. Eng. Ioan Valentin Sita	
	Teachers in charge of application	Lecturer Dr. Eng. Ioan Valentin Sita	

Date of approval in the Department of Automation _____	Head of department Prof.dr.ing. Honoriu VĂLEAN
Date of approval in the Faculty of Automation and Computer Science _____	Dean Prof.dr.ing. Liviu Cristian MICLEA