Syllabus

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Automation and Computer Science
1.3 Department	Automation
1.4 Field of study	Systems Engineering
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 Subject code	54.20

2. Data about the subject

2.1 Subject name	Computer Integrated Manufacturing				
2.2 Course responsible/lecturer	Sl.dr.ing. Sorin HERLE, sorin.herle@aut.utcluj.ro				
2.3 Teachers in charge of applications	Sl.dr.ing. Sorin HERLE, sorin.herle@aut.utcluj.ro				
2.4 Year of study	4	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				DO

3. Estimated total time

3.1 Number of hours per week	5	of which:	Course	2	Seminar	0	Laboratory	3	Project	0
3.2 Number of hours per semester	70	of which:	course	28	Seminar	0	Laboratory	42	Project	0
3.3 Individual study										
(a) Manual, lecture material and notes, bibliography										14
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
(d) Tutoring										14
(e) Exams and tests										3
(f) Other activities:										0

3.4 Total hours of individual study (sum of (3.3(a)…3.3(f)))	55
3.5 Total hours per semester (3.2+3.4)	125
3.6 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	Robot control systems, Electric and electronic control equipment, Hydro-pneumatic control equipment
4.2 Competence	Robots programming, PLCs programming

5. Requirements (where appropriate)

5.1. For the course	N/A
5.2. For the applications	The laboratory activities are mandatory

6. Specific competences

6.1 Professional competences	**C3** Using automation fundamentals, methods of modeling, simulation, identification and analysis processes, computer-aided design techniques. **C5** Application development and implementation of algorithms and automated management structures, using the principles of project management, programming environments and technologies based on microcontrollers, DSPs, programmable logic controllers, embedded systems.
6.2 Cross competences	N/A

7. Course objectives

7.1 General objective	Develop skills in integrated manufacturing systems control
7.2 Specific objectives	Assimilation of theoretical knowledge specific to the integrated manufacturing systems. Develop skills for implementing programs to monitor and control the equipment of an integrated manufacturing system.

8. Contents

8.1 Lecture	No.hours	Teaching methods	Notes
Introduction in Manufacturing	2	Presentation, discussion, video examples face to face or online on Teams platform	
Manufacturing Systems	2		
Manufacturing Operations	2		
Material handling systems	2		
Automatic data capture	2		
Group technology	2		
Flexible manufacturing systems	2		
Concurrent engineering and process planning	2		
Production planning systems	2		
Production control systems	2		
Quality in manufacturing	2		
Sustainable manufacturing	2		
Revolution and evolution in manufacturing	2		
Production systems - recapitulative course	2		

Bibliography

1.Sorin HERLE, Computer integrated manufacturing - Lecture notes - 2022, (on-line: http://rocon.utcluj.ro/sorin/CIMc.html);
2.Mikell P. Groover, Automation, Production Systems, and Computer Integrated Manufacturing (4th edition), Prentice Hall 2016;
3.James A. Rehg, Henry W. Kraebber, Computer-Integrated Manufacturing (3rd edition), Prentice Hall 2005;
4.U. Rembold, B.O. Nnaji, A. Storr, Computer Integrated Manufacturing and Engineering , Addison-Wesley 1993;
5.Masaaki Imai , Gemba Kaizen: A Commonsense Approach to a Continuous Improvement Strategy 2/E –, Hardcover: 448 pages, Publisher: McGraw-Hill Professional; 2 edition (May 23, 2012), ISBN-10: 9780071790352, ISBN-13: 978-0071790352;
6.F. Robert Jacobs, Manufacturing Planning and Control for Supply Chain Management , William Berry (Author), D. Clay Whybark (Author), Thomas Vollmann (Author), Hardcover: 576 pages, Publisher: McGraw-Hill Professional; 1 edition (March 29, 2011), Language: English, ISBN-10: 0071750312, ISBN-13: 978-0071750318;
7.Steven M. Bragg, Inventory Management, 246 pages, Publisher: Accounting Tools (October 4, 2013), Language: English, ISBN-10: 1938910192, ISBN-13: 978-1938910197;
8.Larry Webber, Michael Wallace, Quality Control for Dummies, 384 pages, Publisher: For Dummies; 1 edition (2007), Language: English, ISBN-10: 0470069090, ISBN-13: 978-0470069097.

8.2 Aplications** (seminar/laboratory/project)	No.hours	Teaching methods	Notes
Modeling and simulation of a production line	3	Tutorials and applications face to face or online on Teams/Team Viewer	Software: Logixpro, CX-Programmer, RSLogixPro, ACL, LLWin, Excel, Arena, Flexim, WinMan, MelfaMasic II, Equipment used: PLC Allen Bradley SLC500, PLC Omron CQM1, CPM2A,
Planning processes and production	3		
Flexible manufacturing system. Development and operation	3		
Programming of a dosing system	3		
The control of a mixing and thermal treatment plant	3		
Control of a bottling line	3		
Performance analysis of a manufacturing system	3		
Optimization of production processes	3		
User interfaces for production processes	3		
Programming of a transport and storage system	3		
Programming the scora-er 14pro robot	3		
Programming the scorbot-er 4u robot for sorting operations	3		
Programming a robotic handling system	3		

Programming a robotic assembly station	3		PLC Siemens S3, Robot RTT Fischer technik, Robot Intelitek Scorbot ER-Vplus, robot Mitsubishi RV II AJ
** Each student will choose 12 of the 16 proposed laboratories.			

Bibliography
1. Sorin HERLE, Computer integrated manufacturing, UTPress, ISBN 978-606-737-222-9, 2017;
2. Sorin HERLE, Computer integrated manufacturing, 2022 (on-line: http://rocon.utcluj.ro/sorin/CIMl.html);

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

Skills gained from participating in this discipline will be required engineers dealing with production planning and management, maintenance, manufacturing systems, quality control in production systems, manufacturing control systems, etc.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Questions and/or exercises	Written exam (theory and exercises) or tests at the end of each course. The average of the tests can, on request, replace the exam if a minimum of 70 points out of a maximum of 140 have been accumulated.	50%
Seminar			
Laboratory	Solving applications proposed every laboratory work.	Evaluation at the end of each laboratory according to the grading scale attached to each laboratory documentation and / or colloquium at the end of the semester.	50%
Project	-	-	-
Minimum standard of performance: E ≥ 5, L ≥ 5			

Date of filling in:		**Title Firstname NAME**	**Signature**
29.06.2022	Course	sl.dr.ing. Sorin HERLE	
	Aplications	sl.dr.ing. Sorin HERLE	

Date of approval by the Department Board ……. _____	Head of Departament ……. Prof.dr.ing. Honoriu VĂLEAN
Date of approval by the Faculty Council …… _____	Dean Prof.dr.ing. Liviu Cristian MICLEA