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 Departament	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	54.10

2. Data about the subject

2.1 Subject name	Digital Control of Machine Tools					
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, CAD in automation
4.2 Competence	CAD

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	**C1** 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	Developing skills in CNC machines field.
7.2 Specific objectives	The assimilation of specific theoretical knowledge of materials processing using CNC machines. Developing skills in programming CNC machines.

8. Contents

8.1 Lecture	No.hours	Teaching methods	Notes
Introduction to CNC machine tools	2	Presentation, discussion, video examples face to face or online on Teams platform	
Basics of CNC programming	2		
Programming the linear trajectories	2		
Programming the circular trajectories	2		
Programming the milling operations	2		
Programming the pocket milling operations	2		
Programming the drilling operations	2		
Programming the milling cycles. Part I	2		
Programming the milling cycles. Part II	2		
Turning operations	2		
Programamming the turning operations	2		
Programming the turning cycles	2		
CAD-CAM systems	2		
Summary of the course	2		
Bibliography 1. Sorin Herle, Digital Control of Machine Tools, lecture notes, 2025, http://rocon.utcluj.ro/sorin/DCMTc.html 2. Peter Smid, CNC Tips and Techniques: CNC Tips and Techniques, 200 pages, Publisher: Industrial Press (February 15, 2013), Language: English, ISBN-10: 0831134720, ISBN-13: 978-083113472; 3. Peter Smid, CNC Programming Techniques: An Insider's Guide to Effective Methods and Applications, Industrial Press 2005; 4. Peter Smid, CNC Programming Handbook, Third Edition [Hardcover], 600 pages, Publisher: Industrial Press, Inc.; 3 edition (November 26, 2007), Language: English, ISBN-10: 0831133473, ISBN-13: 978-0831133474			

8.2 Aplications** (seminar/laboratory/project)	No.hours	Teaching methods	Notes
The use of EXSL-WIN software for programming of CNC machines	3	Tutorials and applications face to face or online on Teams/Team Viewer	Software used: EXSL-WIN, CADEM CapsMill CADEM CapsTurn
Programming linear movements for a milling machine	3		
Programming circular movements for a milling machine	3		
Programming face milling and end milling operations	3		
Programming pocket milling	3		
Programming drilling operations on a milling machine	3		
Programming milling operations using cycles. Part I	3		
Programming milling operations using cycles. Part II	3		
Programming turning operations	3		
Programming turning operations using cycles	3		
Programming using Caps Mill CAD-CAM software	3		
Programming using Caps Turn CAD-CAM software	3		
Programming of PC F020 milling machine	3		
Programming of CH-A01 milling machine	3		
** Each student will choose 12 of the 16 proposed laboratories.			
Bibliography 1. Sorin HERLE, Digital control of machine tools, UTPress, ISBN 978-606-737-223-6, 2017; 2. Sorin HERLE, Digital control of machine tools, 2025 (on-line: http://rocon.utcluj.ro/sorin/DCMTl.html);			

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

Skills acquired to this discipline will be useful to the engineers dealing with programming CNC machines.

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
30.01.2025	Course	sl.dr.ing. Sorin HERLE	
	Applications	sl.dr.ing. Sorin HERLE	

Date of approval by the Department Board Automation _____	Head of Departament .... Prof.dr.ing. Honoriu VĂLEAN
Date of approval by the Faculty Council Automation and Computer Science _____	Dean Prof.dr.ing. Vlad MUREŞAN