SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automotive Engineering, Mechatronics and Mechanics
1.3	Department	Automotive Engineering and Transportation
1.4	Field of study	Automotive Engineering
1.5	Cycle of study	Master in Science
1.6	Program of study/Qualification	Tehnici Avansate în Ingineria Autovehiculelor (Advanced Techniques in Automotive Engineering) - în limba engleză
1.7	Form of education	Full time
1.8	Subject code	02.00

2. Data about the subject

2.1	Subject name				Theory and automatization of the automotive components I	
2.2	Subject area				Automotive Engineering	
2.2	Course responsible/lecturer				Assoc. Prof. PhD. Eng. Dan MOLDOVANU – dan.moldovanu@auto.utcluj.ro	
2.3	Teachers in charge of seminars				PhD.Stud.Eng. Tudor Oargă	
2.4 Year of study	I	2.5 Semester	I	2.6 Assessment		E
2.7 Subject category	Formative category					DS
	Optionality					DI

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										20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										11
(d) Tutoring										5
(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	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications seminarului / laboratorului / proiectului	

6. Specific competences

Professional competences	Advanced knowledge of MATLAB Simulink. Implementation of a P, PI, PD, PID control. Basic and advanced knowledge of an automated system.
Cross competence	Report creation. Creating a presentation.

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

7.1	General objective	Developing competences in the Systems and Automation domain.
7.2	Specific objectives	Assimilating theoretical knowledge about Systems and Automation. Knowledge and operation of an automated system. Advanced knowledge of working with MATLAB Simulink.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction. General knowledge.	2	Presentation, discussions	
2. Introduction to MATLAB. Simulink	2		
3. Basic rules when creating a model in MATLAB	4		
4. Scripting in MATLAB. Rules and implementation	2		
5. C code generation from MATLAB Models	2		
6. Static and dynamic check of MATLAB generated C code, using dedicated software.	2		
7. Structure and working of automated systems The transfer function. Frequency response	2		
8. Stability of a system. Typical elements of an automated system	2		

9. Measuring elements. Sensors, transducers	2		
10. Working principles. Classification of transducers. Force transducers, displacement transducers, torque transducers.	2		
11. Temperature transducers. Flow transducers.	2		
12. Analysis of the stability of system using Routh-Hurwitz	2		
13. Implementing the Nyquist criterion	2		
Bibliography 1. Grama, L., Prelucrarea numerica a semnalelor, indrumator de laborator, Cluj-Napoca, U.T. Press, 2014. 2. Gorunescu, F., Analiza exploratory si procesarea datelor cu simulari in MATLAB, Cluj-Napoca, Ed. Albastra, 2013. 3. Hanganut, M., Teoria sistemelor, Ed. Didactica, 1996.			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Introdution to MATLAB. Simulink	2	Presentations, applications	Laboratory work using MATLAB, installed using University licensing.
2. Creation of a simple system in MATLAB	2		
3. Basic functions. Creation of a closed loop system	2		
4. Creation of an m. file with a specific function	2		
5. Testing an automated system	2		
6. Implementation of a system in MATLAB Stateflow	2		
7. Laboratory report check	2		
Bibliography 1. Grama, L., Prelucrarea numerica a semnalelor, indrumator de laborator, Cluj-Napoca, U.T. Press, 2014. 2. Gorunescu, F., Analiza exploratory si procesarea datelor cu simulari in MATLAB, Cluj-Napoca, Ed. Albastra, 2013. 3. Hanganut, M., Teoria sistemelor, Ed. Didactica, 1996.			

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

The accumulated competences are necessary for engineers that are working on new designs and mechanical design in the automotive engineering field using MATLAB.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Theory and problem solving	Questions, written exam	60%
10.5 Seminars /Laboratory/Project	Appreciation of the work during the laboratories	Check of the laboratory work	40%
10.6 Minimum standard of performance			

Laboratory work and project – minimum grade 5(five) Each subject must be solved, minimum grade 5(five) Minimum MATLAB knowledge (create a model, run a model, understanding new models).

Date of filling in:		**Title Surname Name**	**Signature**
24.06.2025	Lecture	Conf. Dr. Ing. Dan Moldovanu	
	Teachers in charge of application	PhD.Stud.Eng. Tudor Oargă	

Date of approval in the department ART 24.06.2025	Head of department Prof.PhD.Eng. Barabás István
Date of approval in the faculty ARMM 25.06.2025	Dean Prof.PhD.Eng. Filip Nicolae