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	09.00

2. Data about the subject

2.1	Subject name			Theory and automatization of the automotive components II		
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			Assoc. Prof. PhD. Eng. Dan MOLDOVANU – dan.moldovanu@auto.utcluj.ro		
2.4 Year of study	I	2.5 Semester	II	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	21
(b) Supplementary study in the library, online and in the field	19
(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	Advanced knowledge of MATLAB

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 applied in the automotive field. Basic and advanced knowledge of an automated system applied in the automotive field.
Cross competences	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 to MATLAB. STATEFLOW.	2	Presentation, discussions	
2. Modelling a mechanical transmission in MATLAB	2		
3. Modelling an automatic transmission in MATLAB	2		
4. Modelling an internal combustion engine (Diesel)	2		
5. Modelling an internal combustion engine (Gasoline)	2		
6. Modelling an electric vehicle part 1	2		
7. Modelling an electric vehicle part 2	2		
8. Modelling a hybrid vehicle part 1	2		
9. Modelling a hybrid vehicle part 2	2		
10. Modelling a vehicle suspension part 1	2		
11. Modelling a vehicle suspension part 2	2		

12. Implementing a HIL system (Hardware In the Loop) using MATLAB – mini-robot part 1	2		
13. Implementing a HIL system (Hardware In the Loop) using MATLAB – mini-robot part 2	2		
14. Implementing a HIL system (Hardware In the Loop) using MATLAB – mini-robot part 3	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. Creation of a powertrain in MATLAB using SimDriveline	2	Presentations, applications	Work using MATLAB, installed using University licensing.
2. Simulation of an Internal Combustion Engine	2		
3. Modelling an electric vehicle	2		
4. Modelling a hybrid vehicle	2		
5. Analysing an automotive suspension using MATLAB and interfacing with other programs (AVL BOOST, AVL CRUISE) part 1	2		
6. Analysing an automotive suspension using MATLAB and interfacing with other programs (AVL BOOST, AVL CRUISE) part 2	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	40%

10.5 Seminars /Laboratory/Project	Appreciation of the work during the laboratories	Check of the laboratory work	60%
10.6 Minimum standard of performance			
Knowledge regarding the V model implementation Creating a working prototype that uses a microcontroller and is programmed in MATLAB			

Date of filling in:		**Title Surname Name**	**Signature**
24.06.2025	Lecture	Conf. Dr. Ing. Dan MOLDOVANU	
	Teachers in charge of application	Conf. Dr. Ing. Dan MOLDOVANU	

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