

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	Advanced Techniques in Automotive Engineering
1.7	Form of education	Full time
1.8	Subject code	01.00

2. Data about the subject

2.1	Subject name	Internal combustion engine electronic management									
2.2	Subject area	Engineering									
2.3	Course responsible/lecturer	Prof. PhD Habil.Eng. Florin MARIASIU- florin.mariasiu@auto.utcluj.ro									
2.4	Teachers in charge of seminars	Assoc.Prof. PhD.Eng. Dan MOLDOVANU- dan.moldovanu@auto.utcluj.ro									
2.5	Year of study	1	2.6	Semester	1	2.7	Assessment	Ex	2.8	Subject category	DA/DI

3. Estimated total time

3.1	Number of hours per week	3	3.2	of which, course:	2	3.3	applications:	1
3.4	Total hours in the curriculum	42	3.5	of which, course:	28	3.6	applications:	14
Individual study								hours
Manual, lecture material and notes, bibliography								20
Supplementary study in the library, online and in the field								20
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								11
Tutoring								5
Exams and tests								2
Other activities								0
3.7	Total hours of individual study	58						
3.8	Total hours per semester	100						
3.9	Number of credit points	4						

4. Pre-requisites (where appropriate)

4.1	Curriculum	N/A
4.2	Competence	General knowledge regarding internal combustion engines

5. Requirements (where appropriate)

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

6. Specific competences

Professional competences	<ul style="list-style-type: none"> • Determine and identify influence parameters (external / internal) on IC engine management system • Identify the components of an IC engine management system • Establish an effective engine management according to the specific operating conditions of the engine • Establish optimum engine performance in order to improve their economic exploitation • To carry out studies to determine the comparative efficiency of factors that characterize an IC engine management system • To create a computer model of an engine based on a physical model • To use information technology to study the IC engine management by processing, analysing and interpreting the experimental data • To work in an multi- and interdisciplinary environment • To create a primary research report
Cross competences	<ul style="list-style-type: none"> • Use appropriate and effective methods and techniques of modern learning; • Appropriate use of specific technical terms, in oral and written communication in a European language (English); • Develop skills and abilities for teamwork • Develop skills of analysis and decision • Using information and communication technology (ICT).

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

7.1	General objective	Developing expertise, competences and specific abilities in automotive engineering domain, with detailed knowledge of an area of specialization (IC engine management) to support vocational training
7.2	Specific objectives	<ul style="list-style-type: none"> •Assimilation of theoretical knowledge about IC engine management •Obtaining computer skills for modeling a physical model, simulation and interpretation of the interdependence between parameters that characterize the functioning of engine management systems •Make calculations, demonstrations and applications, by using of specific software for engine management systems modeling and simulation •Development of technical and/or research primary projects

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1.	Spark ignition engine management systems. Construction and integration	Exposure and applications. Case studies. Courses will be held on-line on UTCN's TEAMS educational platform	2 hours
2.	Spark ignition engine management systems.		2 hours
3.	Compression-ignition engine management systems. Construction and integration		2 hours
4.	Compression-ignition engine management systems.		2 hours
5.	Physical models of spark ignition engine management systems.		2 hours
6.	Physical models of compression-ignition engine management systems.		2 hours
7.	Techniques for discrete meshes		2 hours
8.	Discrete models of spark ignition engine management systems.		2 hours
9.	Discrete models of compressed ignition engine management systems.		2 hours
10.	Cause-effect algorithms of engine management systems (spark ignition engines)		2 hours
11.	Case-effect algorithms of engine management systems (compression ignition engines)		2 hours
12.	Qualitative integration of input / output parameters in the spark ignition engine management system		2 hours
13.	Qualitative integration of input / output parameters in the compressed ignition engine management system		2 hours
14.	Recapitulation course. Presentation of examination conditions.		2 hours
Bibliography <ul style="list-style-type: none"> • F.Mariasiu, C. Iclodean – Managementul motoarelor cu ardere interna, Ed. Risoprint, 2013 • F.Mariasiu, C. Iclodean – Aplicatii numerice in simularea motoarelor cu ardere interna, Ed. UTPress, 2016 • AVL BOOST User manual • Guzzella L., Onder C. - Introduction to Modeling and Control of Internal Combustion Engine Systems, Springer, 2010 • Guzzella L., Sciarretta A. (2007) Vehicle Propulsion Systems Springer, Berlin • Cook J.A., Grizzle J.W., Sun J. (1996) Engine Control. In The Controls Handbook, edited by W. S. Levine, CRC Press-Times Mirror Books • Crolla. D.A. - Automotive Engineering – Powertrain, chassis system and vehicle body, Editura Elsevier, 2009. • Course Notes 			
8.2. Applications/Seminars		Teaching methods	Notes
1.	Presentation of laboratory works and requirements of practical activities	Exposure and applications. Case studies. Courses will be held on-line on UTCN's TEAMS educational platform	2 hours
2.	Principles of IC engine management system's modeling and simulation. Presentation of AVL BOOST program		2 hours
3.	Connecting elements. Particularities.		2 hours
4.	Simulations control and settings. Application of boundary conditions.		2 hours
5.	Engine modeling (establishing functional conditions)		2 hours
6.	Integrating of ECU in model. Defining the parameters and load the (Map Specifications)		2 hours

7.	Simulation of model. Optimizing the engine operation. Analys and interpretation of data.		2 hours
Bibliography <ul style="list-style-type: none"> • F.Mariasiu, C. Iclodean – Aplicatii numerice in simularea motoarelor cu ardere interna, Ed. UTPress, 2016 • AVL BOOST User manual, 2009 • Course Notes 			

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

The skills and competences gained will be required by employees who work in: Design, operation and maintenance of IC engines; Numerical modeling and simulation methods; Design and manufacturing of IC engine, main and secondary systems; Companies specialized in selling of spare parts and accessories etc.

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, on-line exam.	70%
10.5 Applications	Appreciation of the work during the laboratories	Check of the laboratory work	30%
10.6 Minimum standard of performance			
Minimum knowledge: Complete understanding of engine management system operation. Minimal skills: Implementing an internal combustion engine in AVL BOOST. Performing the laboratory work according to the requirements and presentation of the laboratory dossier - minimum 5 (five) Each subject in the test has to be resolved - minimum score 5 (five)			

Date of filling in:		Title Surname Name	Signature
12.10.2020	Lecturer	Prof. PhD Habil. Eng. Florin MARIASIU	
	Teachers in charge of application	Assoc.Prof.PhD.Eng. Dan MOLDOVANU	

Date of approval in the department ART

Head of department
Prof.dr.ing. Istvan BARABAS

Date of approval in the faculty ARMM

Dean
Prof.dr.ing. Nicolae FILIP