

## SYLLABUS

### 1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automotive Engineering, Mechatronics and Mechanics
1.3	Department	Automotive Engineering and Transports
1.4	Field of study	Automotive Engineering
1.5	Cycle of study	Master of Science
1.6	Program of study/Qualification	Advanced Techniques in Automotive Engineering - English
1.7	Form of education	Full time
1.8	Subject code	03.00

### 2. Data about the subject

2.1	Subject name	Auxiliary Internal Combustion Engine Components					
2.2	Subject area	Automotive Engineering					
2.2	Course responsible/lecturer	Lecturer PhD Eng. Nicolae Vlad BURNETE – nicolae.vlad.burnete@auto.utcluj.ro					
2.3	Teachers in charge of seminars	Lecturer PhD Eng. Nicolae Vlad BURNETE – nicolae.vlad.burnete@auto.utcluj.ro					
2.4	Year of study	1	2.5 Semester	1	2.6 Assessment	E	
2.7	Subject category	Formative category					DA
		Optionality					DI

### 3. Estimated total time

3.1	Number of hours per week	3	of which	3.2 Course	1	3.3 Seminar	0	3.3 Laboratory	1	3.3 Project	1
3.4	Total hours in the curriculum	42	of which	3.5 Course	14	3.6 Seminar	0	3.6 Laboratory	14	3.6 Project	14
3.7 Individual study:											
(a) Manual, lecture material and notes, bibliography										20	
(b) Supplementary study in the library, online and in the field										18	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										28	
(d) Tutoring										14	
(e) Exams and tests										3	
(f) Other activities										0	
3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))					83						
3.9 Total hours per semester (3.4+3.8)					125						
3.10 Number of credit points					5						

### 4. Pre-requisites (where appropriate)

4.1	Curriculum	Not required.
4.2	Competence	General knowledge about internal combustion engines.

## 5. Requirements (where appropriate)

5.1	For the course	Not required.
5.2	For the applications seminar / laboratory / project	The attendance (100% presence) and the completion of the activities from the applications condition the admission to the final assessment.

## 6. Specific competences

Professional competences	<ul style="list-style-type: none"> <li>- Knowledge of parts, systems, installations and equipment currently in use in internal combustion engines (i.c.e.);</li> <li>- Ability to describe, explain and demonstrate their operation;</li> <li>- Identify the components of auxiliary systems of an i.c.e.;</li> <li>- Ability to perform case studies and simulation in order to identify the influences that different components have on the operation, performances and pollutant emissions of the i.c.e.;</li> <li>- Develop competencies in a multi- and interdisciplinary environment;</li> <li>- Develop a preliminary research report.</li> </ul>
Cross competences	<ul style="list-style-type: none"> <li>- Teamwork abilities;</li> <li>- Written and oral communication abilities in english and romanian;</li> <li>- Communication (oral and written) in English and Romanian;</li> <li>- Research, analysis and decision-making abilities;</li> <li>- Respect for professional work ethics.</li> </ul>

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

7.1	General objective	Develop specific competencies in the field of internal combustion engine auxiliary systems for professional growth.
7.2	Specific objectives	<ol style="list-style-type: none"> <li>1. Assimilating theoretical knowledge about auxiliary engine systems used in modern i.c.e.;</li> <li>2. Understanding the role of auxiliary engine components and their integration in these systems;</li> <li>3. Create a virtual model of the physical system to simulate its operation to highlight, understand and interpret its effects on the i.c.e.</li> </ol>

## 8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. ICEs. Basics and future development	2	Presentations, discussions	
2. Alternative fuels supply systems	2		
3. Aftertreatment systems for SIEs	2		
4. Aftertreatment systems for CIEs	2		
5. Charging systems	2		
6. Variable valve actuation	2		
7. Other ICE systems	2		

Bibliography			
1. Robert Bosch GmbH, Bosch Automotive Handbook, Wiley, 2014			
2. Van Basshuysen, R., Schaefer, F., Internal Combustion Engine Handbook, 2nd English Edition, SAE International, 2016			
3. Mollenhauer, K., Tschöke, H., Handbook of Diesel Engines, Springer, 2010			
8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Presentation of the laboratories. Work safety notions	2	Presentations, applications	
2. Analysis of the EGR system	2		
3. Analysis of charging systems	2		
4. Analysis of the SCR system	2		
5. Analysis of DPFs	2		
6. Analysis of START-STOP systems	2		
7. Recap and check of the laboratory work	2		
Bibliography			
1. ***Robert Bosch GmbH, Bosch Automotive Handbook, Wiley, 2014			
2. ***AVL Boost Manuals			
3. ***MTZ Worldwide			
4. Mariaşiu, F., Iclodean, C., Aplicații numerice în simularea motoarelor cu ardere internă, UTPress, 2016			
8.2. Project	Number of hours	Teaching methods	Notes
1. Presentation of project requirements	2	Presentations, applications	
2. Discussion of scientific papers in the field of the project and of the approach	2		
3. Gather experimental data	2		
4. Presentation of an initial model	2		
5. Improvement of the model	2		
6. Discussion of results	2		
7. Final verification and presentation of the project	2		
Bibliography			
1. ***AVL Boost Manuals			
2. *** <a href="https://www.sciencedirect.com/">https://www.sciencedirect.com/</a>			
3. *** <a href="https://scholar.google.com/">https://scholar.google.com/</a>			
4. Mariaşiu, F., Iclodean, C., Aplicații numerice în simularea motoarelor cu ardere internă, UTPress, 2016			

**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 working in research and developments, mechanical engineering etc. in the field of automotive engineering.

## 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	Online evaluation (quiz).	50%
10.5 Seminars /Laboratory/Project	Appreciation of the work done during the laboratories	Check of the laboratory work and presentation of a research report	50%
10.6 Minimum standard of performance			
Minimum knowledge: Understanding modern auxiliary systems Minimum Competencies: Competent Assessment of Modern Auxiliary Systems Performing the laboratory work according to the requirements - minimum 5 (five) Turning in a complete and correct project - minimum 5 (five) The quiz must be passed with a minimum score of 5 (five)			

Date of filling in:		Title Surname Name	Signature
12.10.2020	Lecturer	Lecturer PhD Eng. Nicolae Vlad BURNETE	
	Teachers in charge of application	Lecturer PhD Eng. Nicolae Vlad BURNETE	

Date of approval in the department .....	Head of department Prof.dr.ing. Barabás István
_____	
Date of approval in the faculty .....	Dean Prof.dr.ing. Filip Nicolae
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