

COURSE SYLLABUS

Test beds, measurement, and control basics

2021-2022

1. Program information

1.1	Higher education institution	<i>University of Pitesti</i>
1.2	Faculty	<i>Mechanics and Technology</i>
1.3	Department	<i>Automobiles and Transport</i>
1.4	Field of studies	<i>Automotive Engineering</i>
1.5	Level of education	<i>Master</i>
1.6	Program / Qualification	<i>Automotive Engineering for Sustainable Mobility</i>

2. Discipline information

2.1	Name of discipline	<i>Test beds, measurement, and control basics</i>									
2.2	Instructor of the lecture/course activities	<i>Adrian CLENCI</i>									
2.3	Instructor of the lab activities	<i>Adrian CLENCI</i>									
2.4	Year of the studies	<i>I</i>	2.5	Semester	<i>I</i>	2.6	Type of evaluation	<i>E¹</i>	2.7	The discipline regime	<i>O, DAP²</i>

3. Estimated total time

3.1	Number of hours per week	3	3.2	lecture	2	3.3	lab	1
3.4	Total hours of the Academic Syllabus	42	3.5	lecture	28	3.6	lab	14
Distribution of the time allocated to the individual study (= Nb. of credits x 25 – Total hours of the Academic syllabus = 4 x 25 – 42 = 58 hours)								ore
Study by handbook, course support, bibliography and notes								20
Additional documentation in the library, on specialized electronic platforms and in the field								15
Preparation of seminars / laboratories, topics, reports, portfolios, essays								15
Tutorial								4
Examinations								4
Other activities...								
3.7	Total hours of individual study	58						
3.8	Total hours per semester (= 3.4 + 3.7)	100						
3.9	Number of credits allocated to the discipline	4						

4. Prerequisites (where applicable)

4.1	Curriculum	<i>Not applicable</i>
4.2	Skills	<i>Mathematics, Physics, Mechanics, Numerical methods, Electrotechnics, Electronics and automatic systems, Vehicle dynamics, Thermodynamics, Automobile's construction, Fuel economy and environment protection, Testing and homologation</i>

5. Conditions (where applicable)

5.1	for the lecture/course	<i>Classroom equipped with board, video projector, projection screen, computer</i>
5.2	for the lab	<i>Board, computer, lab equipments, test bench</i>

6. Course goal(s)

6.1	The main goal of the discipline	<i>Development of competences in the field of Automotive Engineering by transmitting to the students the notions related to test beds, measurement, and control basics</i>
6.2	Specific goal(s)	<i>At the end of this course, the student should be able to discuss on this particular subject: the architecture of the test beds used to homologate an automobile, their control and measurements</i>

¹ E – Exam

² O – compulsory; DAP – deepening discipline

7. Contents

7.1. Lecture/course		No. of hours	Teaching methods	Remarks Resources used
1	Introduction: automotive industry and sustainable mobility; passenger cars homologation/type approval; legislative regulations regarding chemical pollution and CO ₂ emission.	2	Lecture	Board, sketches, tables, graphs, sheets, photos, models, video projector, computer, internet
2	Prerequisites: International System of Units (SI); notions about energy balance; operating area of engine/motor; engine/motor performance	2	Exposure with support material	
3	Engine test bench: general layout; types; subsystems and operation; tests and results	4	Explanation	
4	Roller test bench (chassis dynamometer): general layout; types; subsystems and operation; tuning of the vehicle on the bench; road law; different tests and results	4	Description and exemplification	
5	Real Driving Emissions (RDE) via Portable Emissions Measurement Systems (PEMS): legislative packages; boundary conditions; validation criteria; pre-, main-, post-test; conformity factor	4	The heuristic conversation	
6	Measurement: data acquisition systems; types of signals; characteristics of sensors/transducers (pressure, temperature, flow measurement, gas analysis)	8	Debating	
7	Control basics: ON-OFF, PWM, PID, open and closed loop	4	Case study	
TOTAL HOURS		28		
7.2. Lab		No. hours	Teaching methods	Remarks Resources used
1	Engine test bench: operation, control and measurement	6	Explanation	board, sketches, graphs, photos, models, computer, internet, lab equipment video projector
2	Roller test bench: operation, control and measurement (in collaboration with RTR)	2	Description and exemplification	
3	RDE tests via PEMS (in collaboration with RTR)	4	The heuristic conversation	
4	Lab closure	2	Debating	
TOTAL HOURS		14		
Minimal bibliography:				
Clenci A – Test beds. Support material (171 slides)				
Hughes, T.A. – Measurement and control basics, ISA, 2002				
Martyr, A.J., Plint, M.A - Engine testing. Theory and practice, Elsevier, BH, 2007				
Bonnick, A. – Automotive Science and Mathematics, Elsevier, BH, 2008				
Galindo, E - Chassis Dynamometer Testing, SAE International, 2017				

8. Corroboration the contents of the discipline with the expectations of the epistemic community representatives, professional associations and employers in the field related to the program

The skills acquired in this discipline allow the graduates to work in the field of automotive engineering: design, calibration, test, validation, and homologation of passenger cars. Being a specialized discipline, its purpose is training the students, especially for engineering centers (design, research, development, innovation).

9. Evaluation

Activity type	10.1 Evaluation Criteria	10.2 Evaluation methods	10.3 Percentage of the final grade
10.4 Course	Active involvement during the lectures	Questions / answers. Weekly recording	10%
	Good understanding of the treated subjects and the ability to analyze and synthesize	Written and oral exam	50%
10.5 Lab	Active involvement during the activity throughout the semester	Questions / answers. Individual discussions. Weekly recording	20%
10.6. Homework	Correct resolution. Quality of presentation	Oral presentation. Individual discussions	20%
10.7 Minimum standard of performance	<ul style="list-style-type: none"> • handling of the units of measure involved in the specific parameters of the discipline • knowledge of the architecture of the test beds presented, of the basics of measurement and of the structure of the automatic control systems 		

Date (of filling)
17.09.2021

Instructor (lecture/course)
Adrian CLENCI, Professor

Instructor (lab)
Adrian CLENCI, Professor

Date (of approval)
21.09.2021

Director of supplying department
Helene ŞUSTER, ş.I.

Director of beneficiary department
Helene ŞUSTER, ş.I.