

DISCIPLINE FILE

Environmental Problems of Automotive Engineering

UP.02.DSI.3.O.21.19-AI

1. Program information

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

2. Discipline information

2.1	Name of discipline		Environmental Problems of Automotive Engineering								
2.2	Teacher of the course activities		Florian IVAN								
2.3	Teacher of the seminar activities		Florian IVAN								
2.4	Year of the studies	II	2.5	Semester	I	2.6	Type of evaluation	E	2.7	The discipline regime	O/AI

3. Estimated total time

3.1	Number of hours per week	3	3.2	from which course	2	3.3	laboratory	1
3.4	Total hours of the Academic Syllabus	42	3.5	from which course	28	3.6	laboratory	14
Distribution of the time allocated to the individual study								ore
Study by handbook, course support, bibliography and notes								50
Additional documentation in the library, on specialized electronic platforms and in the field								50
Preparation of seminars / laboratories, topics, reports, portfolios, essays								60
Tutorial								6
Examinations								6
Other activities								
3.7	Total hours of individual study						172	
3.8	Total hours per semester²						214	
3.9	Number of credits allocated to the discipline						7	

4. Preconditions (where applicable)

4.1	Curriculum	Not applicable
4.2	Skills	Physics, Thermodynamics and Thermal Equipment, Internal Combustion Engines

5. Conditions (where applicable)

5.1	for the course	Classroom equipped with board, video projector, projection screen, computer
5.2	For the seminar	Classroom equipped with board, video projector, projection screen, computer

6. Specific skills acquired

Professional skills	Application of the principles and methods of the exact sciences and of nature in the construction of physico-mathematical models for simulating the functioning of vehicles. Use of appropriate criteria and methods to identify the correspondence of concepts, theories and models in the field of automotive engineering with the real systems to which they refer. Developing professional projects with the consistent use of theories and methods specific to road vehicles.
transversal skills	Execution of professional tasks according to the specified requirements and within the required deadlines, following a predetermined work plan and under qualified guidance. Easy integration within a group, assuming specific roles and achieving good communication in the group. Achieving personal and professional development, efficiently using their own resources and modern study tools.

7. Objectives of the discipline

7.1	The main objective of the discipline	The general objective of the discipline is to deepen the main notions of the impact automotive- environment
7.2	Specific objectives	<ul style="list-style-type: none"> - To deepen and apply the theory from Combustion – Related Emissions in Engines and Mesures of Control Technologies in Engines ; - Deepening the theory and apply from evaluation of legislative measures and the emission standards - Deepening the theory and apply from evaluation of methods for testing of vehicles and methods from trafic management

8. Contents

8.1. Cours		No. hours	Teaching methods	Remarks Resources used
1	Environment Aspects of Air Pollution. Emission and Atmospheric Concentrations of Substances with Global Effects. Health Aspects of Air Pollution	2	- Lecture - Exposure with support material - Explication - Description and exemplification - The heuristic conversation - Debate - State the problem - Exercise	boardt, sketches, tables, graphs, sheets, photos, models, video projector, computer, internet
2	Economic and Planning of Transportation Emission	2		
3	Combustion – Related Emissions in SI Engines	4		
4	Control Technologies in Spark-Ignition Engines	2		
5	Combustion – Related Emissions in CI Engines	4		
6	Control Technologies in CI Engines	2		
7	Fuel Effect on Emissions	2		
8	Calculation Model for Determining Emissions from Passenger Car and Heavy-Duty Vehicle Traffic	6		
9	Legislative Measures. Level of Emission Standards. Testing of Vehicles. Traffic Management	4		
TOTAL HOURS		28		

8.2. Exercises – Laboratory work		No hours	Teaching methods	Resources/Observations
1	Preseting the cycles of testing for the automobile's certification and the traffic approval. The European Cycle; Californian Cycle; Japanese Cycle. Presenting in a comparative manner the limits of the pollution imposed by the EU regulations, the North American regulations and the Japanese regulations Exercises: finding the mean speed on each part of the cycle described above. Finding the mean noxious fumes on each part of the cycle described above	2	Group exercise	Black board/whiteboard, computer, posters
2	Experimental investigation/design: measurement of CO, HC, and the intensity of pollution created by the compression ignition engines (m.a.c) of the automobiles	2	Group exercise	Laboratory infrastructure
3	Presentation and the construction of the de-pollution systems by treating evacuation gases: re-circulating flue gas (EGR), catalytic reactors on three paths (TWC), systems of recovering fluid gases, systems of aspirating crankgases, particulate filters (DPF), catalytic selective systems (SCR) – using Ad Blue, Nox Trap Systems, catalytic systems of oxidation for Diesel engines (DOC)	2	Group exercise	Black board/whiteboard, computer, posters, video-projector
4	Exercises regarding modelling, at a macroscopic level, of pollution gases from the traffic: Corinair model; TRRL model; HBEFA model; MOBILE/MOVES model	4	Group exercise	Black board/whiteboard, computer, posters
5	Exercises regarding modeling the dispersion of pollution gases distribution in urban areas, using Eulerian, and Lagrangian statistical representation (Gauss curve)	2	Group exercise	Black board/whiteboard, computer, posters
6	Analysis on the technological flow and the subsequent schema specific to recovering and recycling materials from the dismantling centers of VSU	2	Group exercise	Black board/whiteboard, computer, posters, video-projector
TOTAL HOURS		14		

Minimal bibliography:

- Ivan, FI. Liță, D., Bușoi, A. - *Metode și mijloace de depoluare a motoarelor pentru automobile*, Editura MATRIX Rom, București, 2014, ISBN 978-606-25-0038-2, 222 pag.
- Dascăl, A., Ivan, FI. - *Controlul și reducerea poluării la autovehiculele rutiere*, Editura PIM Iași, 2014, ISBN: 978-606-13-2110-0, 334 pag.
- Cristea, D., Ivan, FI. - *Economicitate și poluare*. Litografia Universității Pitești, 1996.
- Oprean, M.I. - *Automobilul modern*, Editura Academiei Române, București, 2003;

5. Eran Sher – Handbook of Air Pollution from Internal Combustion Engines. Academic Press, USA - 1998.
 6. Hans Peter Lenz, Christian Cozarini – Emissions and Air Quality, SAE, Inc. Warrendale, Pa. USA -1998.
 7. Ronald Heck, Robert Farrauto – Catalytic Air Pollution Control – Commercial Technology, VNB, Division of International Publishing Inc, New York, 2005.

9. 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, homologation of thermal engines and automobiles. Being a specialized discipline, its purpose is to training students, especially for engineering centers (design, research, development).

10. Evaluation

Activity type	10.1 Evaluation Criteria	10.2 Evaluation methods	10.3 Percentage of the final grade
10.4 Course	Final evaluation	Written and oral exam	50%
10.5 Seminar	Involvement in activity throughout the semester	Questions / answers. Individual discussions	20%
10.6. Work for home	Correct resolution. Quality of presentation	Oral presentation. Individual discussions	30%
10.6 Minimum standard of performance	<ul style="list-style-type: none"> - Evaluation of Combustion – Related Emissions in SI Engines and Mesures of Control Technologies in Spark-Ignition Engines - Evaluation of Combustion – Related Emissions in CI Engines and Mesures of Control Technologies in CI Engines - Evaluation of legislative measures and the emission standards. - Evaluation of methods for testing of vehicles and methods from trafic management 		

Date completed
17.09.2021

Teacher of the course
prof.dr.ing. Florian IVAN

Teacher of the seminar
prof.dr.ing. Florian IVAN

Date of approval in the Department Council,
29.09.2021

Head of department,

Head of department DAT,
Sl.dr.ing. Helene SUSTER