

COURSE SYLLABUS

Automotive fuels and energy conversion

UP.02.DAP.1.O.21.03-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		Automotive fuels and energy conversion						
2.2	Teacher of the course activities		Niculescu Rodica						
2.3	Teacher of the seminar activities		Niculescu Rodica						
2.4	Year of the studies	I	2.5 Semester	I	2.6 Type of evaluation	E	2.7	The discipline regime	O, DAP

3. Estimated total time

3.1	Number of hours per week	4	3.2	from which course	2	3.3	laboratory	2
3.4	Total hours of the Academic Syllabus	56	3.5	from which course	28	3.6	laboratory	28
Distribution of the time allocated to the individual study								ore
Study by handbook, course support, bibliography and notes								10
Additional documentation in the library, on specialized electronic platforms and in the field								10
Preparation of seminars / laboratories, topics, reports, portfolios, essays								20
Tutorial								
Examinations								4
Other activities								
3.7	Total hours of individual study			44				
3.8	Total hours per semester²			100				
3.9	Number of credits allocated to the discipline			4				

4. Preconditions (where applicable)

4.1	Curriculum	Not applicable
4.2	Skills	Chemistry, Physics, Mathematics, 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 laboratory	lab equipments, board, video projector, projection screen, computer

6. Competențe specifice acumulate

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 notions on the characteristics and use of renewable fuels, correlate with the performance of automobiles in the context of current environmental protection legislation, applying the principles of energy conversion in concrete cases in cars.
7.2 Specific goal(s)	- to have the basic knowledge regarding the problems related to the physico-chemical properties and the rational use of renewable fuels for automobiles, according with the current requirements of the engines and the legislation regarding the environmental protection; - deepening the theory of energy conversion. Practical applications for automobiles. Rankine Cycle. Seeback Effect. Peltier Effect

8. Contents

8.1. Cours		No. hours	Teaching methods	Remarks Resources used
1	Introduction: Renewable fuels and Energy conversion in the context of Sustainable Mobility	2	- Lecture	boardt, sketches, tables, graphs, sheets, photos, models, video projector,
2	Renewable fuels: Biodiesel; Bio-ethanol; Bio-methanol; Bio_gas; Bio-hydrogen; Syntetyc Fuels	12	- Exposure with support material - Explication - Description and	

3	Basic physical quantities and definitions specific to heat transfer. Fundamental modes of heat transfer. Conduction, convection and radiation propagation of heat through Complex heat transfer	4	<i>exemplification</i> - The heuristic conversation - Debate - State the problem -Exercise	<i>computer, internet</i>
4	Heat exchangers: construction, calculation	2		
5	Thermodynamic properties of two-phase systems. State equations of real gases	2		
6	Energy conversion: Rankine Cycle. Seeback Effect. Peltier Effect	6		
TOTAL HOURS		28		

8.2. Laboratory		No. hours	Teaching methods	Remarks Resources used
1	Volatility. curve: a) Atmospheric Distillation; b) Low Pressure Distillation	4	-Experiments - Lecture - Exposure with support material - Explication - Description and exemplification - The heuristic conversation - Debate - State the problem	<i>lab. equipment board, sketches, tables, graphs, sheets, photos, models, video projector, computer, internet,</i>
2	Viscosity	2		
3	Flash point	2		
4	Density	2		
5	Cold flow characteristics: CP, CFPP	2		
6	Chromatographic analysis of the composition for: Biodiesel, bio-gas; GPL	6		
7	Heat exchangers: construction, calculation - general notions	2		
8	Thermodynamic properties of two-phase systems. State equations of real gases. Numerical applications	2		
9	Energy conversion: Rankine Cycle. Seeback Effect. Peltier Effect	4		
10	Evaluation	2		
TOTAL ORE		28		

Minimal bibliography:

- Niculescu R. – *lecture notes*, 2021
- Rodica Niculescu, Adrian Clenci, Victor Iorga-Simăn, *Diesel fuels - physico-chemical properties*, Ed. LAMBERT Academic Publishing, 2018
- Adrian Clenci, Rodica Niculescu, Amélie Danlos, Victor Iorga-Simăn and Alina Trică; *Impact of Biodiesel Blends and Di-Ethyl-Ether on the Cold Starting Performance of a Compression Ignition Engine*; *Energies* 2016, 9(4), 284; <https://doi.org/10.3390/en9040284>
- Rodica Niculescu, Adrian Clenci and Victor Iorga-Siman; *Review on the Use of Diesel–Biodiesel–Alcohol Blends in Compression Ignition Engines*; *Energies* 2019, 12, 1194; doi:10.3390/en12071194 www.mdpi.com/journal/energies
- R Niculescu, A Clenci, M Năstase, C Zaharia, V Iorga-Simăn; *Overview on the synthetic transport fuels as a solution for carbon neutrality*; COFRET2021
- Rey G. Montemayor, *Distillation and Vapor Pressure Measurement in Petroleum Products*, ASTM International, 2008
- PK Nag - *Basic and applied thermodynamics*, The McGraw-hill Publishing, 2006
- Onkar Singh - *APPLIED THERMODYNAMICS*, 2009
- K. Yang, ș.a. - *Effects of Degree of Superheat on the Running Performance of an Organic Rankine Cycle (ORC) Waste Heat Recovery System for Diesel Engines under Various Operating Conditions*, *Energies* 2014, 7, 2123-2145; doi:10.3390/en7042123
- J. Steven Brown, ș.a. - *Methodology for estimating thermodynamic parameters and performance of working fluids for organic Rankine cycles*, *Energy* 73 (2014) 818-828
- Fuel laboratory - Internal working instructions

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).

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	Weekly recording	10%
	Good understanding of the treated subjects and the ability to analyze and synthesize, final evaluation	Written and oral exam	50%
10.5 Laboratory	Involvement in activity throughout the semester	Questions / answers / test. Individual discussions	20%
10.6. Work for home	Correct resolution. Quality of presentation	Oral presentation. Individual discussions	20%

10.6 Minimum standard of performance	- minimum 50% activ participation in each periodic activity
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Date (of filling)
27.09.2021

Instructor (lecture)
Assoc prof.phd.eng. **Rodica NICULESCU**

Instructor (sem)
Assoc prof.phd.eng. **Rodica NICULESCU**

Date (of approval)
29.09.2021

Director of supplying department
lecturer **Helene BĂDĂRĂU-ȘUSTER**

Director of beneficiary department
lecturer **Helene BĂDĂRĂU-ȘUSTER**