COURSE SYLLABUS
Automotive fuels and energy conversion

UP.02.DAP.1.O.21.03-AI

1. Program information

1.1	Higher education institution	The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre
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/Al

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 semester[2]**	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. Competenţe specifice acumulate

Professional skills	*C1. - innovative design and design with the purpose of producing products, technologies that ensure sustainable (sustainable) mobility* *C2. - numerical modeling and simulation of the various components, sub-assemblies and assemblies of the car, in the context of minimizing the number of physical prototypes* *C3. - calibration of different vehicle subsystems for energy optimization purposes* *C4. - experimental research with the purpose of validating the prototypes resulting from the activities of conception, design, modeling and numerical simulation* *C5. - documenting and exploiting the information*
transversal skills	*CT2 - professional communication*

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* *- Exposure with*	*boardt, sketches,*

2	Renewable fuels: Biodiesel; Bio-ethanol; Bio-methanol; Bio_gas; HVO; Bio-hydrogen; Syntetyc Fuels	12	*support material* *- Explication* *- Description and exemplification* *- The heuristic conversation* *- Debate* *- State the problem* *-Exercise*	*tables, graphs, sheets, photos, models, video projector, computer, internet*
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		
4	Heat exchangers: construction, calculation	2		
5	Thermodynamic properties of two-phase systems. State equations of real gases	2		
6	Energy conversion: Seeback Effect. Peltier Effect. Rankine Cycle. Stirling Cycle. Ericsson Cycle	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*	*lab. equipment board, sketches, tables, graphs, sheets, photos, models, video projector, computer, internet*,
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: Seeback Effect. Peltier Effect,	4		
10	Evaluation	2		
	TOTAL ORE	28		

Minimal bibliography:

1. Niculescu R. – *lecture notes*, 2023
2. Rodica Niculescu, Adrian Clenci, Victor Iorga-Simăn, *Diesel fuels - physico-chemical properties*, Ed. LAMBERT Academic Publishing, 2018
4. 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
5. 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
6. R Niculescu, A Clenci, M Năstase, C Zaharia, V Iorga-Simăn; *Overview on the synthetic transport fuels as a solution for carbon neutrality*; COFRET2021
7. Rey G. Montemayor, *Distillation and Vapor Pressure Measurement in Petroleum Products*, ASTM International, 2008
8. PK Nag - *Basic and applied thermodynamics*, The McGraw-hill Publishing, 2006
9. Onkar Singh - *APPLIED THERMODYNAMICS*, 2009
10. K. Yang, ş.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
11. J. Steven Brown, ş.a. - *Methodology for estimating thermodynamic parameters and performance of working fluids for organic Rankine cycles*, Energy 73 (2014) 818-828
12. Développement d'un prototype de micro---cogénératon Bois incluant un moteur Ericsson à cycle de Joule ouvert. Marie Creyx, doctorante Encadrants de thèse: Céline Morin, Eric Delacourt, Bernard Desmet Laboratoire TEMPO --- Université de Valenciennes Journée micro---cogénéra/on – 23 janvier 2014 – CNAM, Paris
13. 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	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		

Date (of filling) 20.09.2023	Instructor (lecture) Assoc prof.phd.eng.habil. **Rodica NICULESCU**	Instructor (sem) Assoc prof.phd.eng. habil.**Rodica NICULESCU**
Date (of approval) 29.09.2023	Director of supplying department lecturer phd..**Helene BĂDĂRĂU-ŞUSTER**	Director of beneficiary department lecturer phd. **Helene BĂDĂRĂU-ŞUSTER**