

COURSE SYLLABUS

1. Program information

1.1. Institution	Petroleum Gas University of Ploiesti
1.2. Faculty	Petroleum Refining and Petrochemistry
1.3. Department	Petroleum Refining and Environment Protection Engineering
1.4. Field of study	Chemical Engineering
1.5. Study cycle	Master Degree
1.6. Study program	Chemical Engineering for Refineries and Petrochemistry

2. Course information

2.1. Course title	Raw materials and products in the petroleum refining industry		
2.2. Course coordinator	Assistant Professor PhD. Cristina Dutescu - Vasile		
2.3. Laboratory / seminar coordinator	Assistant Professor PhD. Cristina Dutescu - Vasile		
2.4. Year of study	1		
2.5. Semester *	I		
2.6. Evaluation type	Exam		
2.7. Course type - formative category **	DF	2.8. Type of subject matter ***	C

* the semester number is in accordance with the curriculum;

** fundamental = DF; domain = DD; speciality = DS; complementary = DC; thoroughgoing = DA; synthesis = DSI.

*** compulsory = C; optional = O; elective = E

3. Total estimated time (teaching hours per semester)

3.1. Number of hours per week	6	of which: 3.2.course	3	3.3. Seminars/laboratories	3	3.4Project	-
3.4. Total hours from curriculum	84	of which: 3.5.course	42	3.6. Seminars/laboratories	42	3.8Project	-
3.9. Time distribution							hours
Study of textbook, course support, bibliography and notes							8
Further reading in the library, on online platforms and fieldwork							6
Preparing seminars / laboratories, homework, portfolios and essays							6
Tutoring							2
Examinations							2
Other activities							0
3.10. Total hours of individual study	24						
3.11. Total hours per semester	108						
3.12. Number of credits	6						

4. Prerequisites (where applicable)

4.1. of curriculum	➤ Knowledge of Physical-Chemistry of Petroleum, Organic Chemistry, Analytical Chemistry, Petroleum Distillation, Thermal – Catalytic Processes
4.2. of skills	➤ -

5. Requirements (where applicable)

5.1. of course	➤ Classroom equipped with video projector and screen
5.2. of seminars/laboratory	➤ Laboratory equipped with specific devices for laboratory work

6. Specific competences

Professional competences	<ul style="list-style-type: none"> • Description, analysis and advanced utilization of engineering concepts and fundamental theories in petroleum refining. • Characterization of physical and chemical structural properties, of petroleum products by complex analytic methods. • Modeling, simulation and design of chemical processes.
Cross-curricular competences	<ul style="list-style-type: none"> • Documentation, information and scientific literature research. • Independent and autonomous achievement of individual professional tasks. • Management organization and planning of professional teams and organizations.

7. Course objectives (based on the competence grid)

7.1. General objective	<ul style="list-style-type: none"> ➤ Knowledge of the main properties of the fossil and unconventional raw materials that can be used in the refining industry, as well as the products obtained from them; the analytical methods involved in raw materials and products characterization; the usefulness of these products; Correlation of the quality of raw materials and products with the standards in force; Capacity of synthesis and correlation of experimental results, presenting ability and reasoning of the findings; Laboratory skills: operation of the apparatus, calculation methods specific to the discipline; Discipline, rigor, seriousness. ➤ Students acquire knowledge of chemical composition, molecular structure, physical and chemical properties, methods of analysis, fields of use, aspects of environmental protection. ➤ It also aims the students to assimilate the necessary skills to perform the analyses of different raw materials and petroleum products, the processing and critical interpretation of the obtained analytical data, the correlation of the experimental data obtained with the directions of use of the various raw materials and products.
7.2. Specific objectives	<p>After completing the discipline students will be able to:</p> <ul style="list-style-type: none"> ➤ Characterize conventional and unconventional raw materials or petroleum products from the point of view of their physical characteristics and chemical composition. ➤ Highlight the influence of chemical composition on the useful characteristics of petroleum products and will make correlations between the two aspects.

	<ul style="list-style-type: none"> ➤ Choose the optimal oil processing scheme, depending on their chemical composition and physical properties ➤ Correctly expose the correlation of chemical composition - price - useful features.
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8. Contents

8.1. Course	Time	Teaching methods	Comments
Native materials: Conventional crude oils, unconventional crude oils: Crude oil with high acidity, heavy and extra heavy crude oils, foamy crude oil, combustion crude oil, bitumen, condensate, natural gas, refinery gas, bituminous sand, bituminous rocks - properties and compositions	10	The course is presented to students in a conventional way, by systematically exposing information in oral lectures and in course notes offered to students. In cases where the subject of the course permits, along with explanations given to students, conversations between students and the teacher are initiated, so students can identify themselves on the basis of the accumulated knowledge (in the course of Oil Physics and Chemistry, as well as in the previous disciplines required) correlations between the chemical structure and the properties of petroleum products. The conversation stimulates critical thinking and divergence, the ability to analyse, synthesize and interpret data. In order to fix the knowledge, from time to time students receive 1-2 questions related to the subjects of the previous course, to which they have to answer in writing in 5-10 minutes. Subsequently, the answers are discussed, with the deepening of the critical points.	
Manufactured material: Wax, resins, asphalt, tar, pitch, coals, synthetic crude oil - properties and compositions	4		
Derived materials: asphaltenes, carbenes, carboids, resins and oil - properties and compositions	4		
Oil prices: pricing strategies, type of oil, oil price history, future of oil	4		
Petroleum products and test methods: crude assay, LPG, automotive fuels, aviation fuels, kerosene, furnace fuels, lubricating oil and grease.	12		
Miscellaneous products: solvents, sulphur, carbon black feed stock, wax	4		
Elements of standardization, assurance, auditing and certification of the quality of petroleum products	4		
<p>Bibliography</p> <ol style="list-style-type: none"> 1. Onutu I., Juganaru T., Merceologia produselor petroliere, Ed. U.P.G. Ploiesti, 2018 2. Speight, J.G., The Chemistry and Technology of Petroleum, 3rd Edition. Marcel Dekker, New York. 1999 3. Wauquier, J.P., Petrol brut. Produits petroliers. Schemas de fabrication, Ed. Technip, Paris, 1994. 4. Riazi, M.R., "characterization and Properties of Petroleum Fractions, American Society for Testing and Materials, 2005 5. James G. Speigh, Handbook of Petroleum Product Analysis, John Wiley & Sons, 2002 			

6. Uttam Ray Chaudhuri, Fundamentals of Petroleum and Petrochemical Engineering, CRC Press, Taylor & Francis Group, 2010			
7. Totten, G. E., Fuels and Lubricants Handbook, ASTM International, 2003			
8.2. Seminar / laboratory	Time	Teaching methods	Comments
Chemical analysis and physical characterization of a condensate	4	Colloquial system in which students participate in the choice of the analysis methods and proper conduct the experimental procedures; on-going discussions launched upon results.	
Characterization of an aviation fuel	4		
Formulation of consistent grease	4		
Determination of rheological properties of consistent grease	4		
Chemical analysis of an atmospheric distillation petroleum residue	4		
Determination of the wax content of petroleum products	4		
Determination of rheological properties of bitumen	4		
Qualitative determination of mineral acidity and alkalinity of bitumen. Determination of the content of soluble substances from bitumen	6		
Presentation of papers	8	Oral lecture and discussion. Plagiarism, copying, use of internet advertising materials, etc. are not accepted. Each theme or work submitted for evaluation must be personal.	
Bibliography			
1. Lazarovici, V., Rădulescu, S., Orășanu, L., Brebeanu, Ghe., Chimia petrolului. Lucrări practice. Partea I, I.P.G. Ploiești, 1985.			
2. Wauquier, J.P., Petrol brut. Produits petroliers. Schemas de fabrication, Ed. Technip, Paris, 1994			
3. Riaz, M.R., "Characterization and Properties of Petroleum Fractions", American Society for Testing and Materials, 2005			
4. Speight, J.G., Handbook of Petroleum Analysis. John Wiley & Sons, New York, 2002.			
5. Totten, G. E., Fuels and Lubricants Handbook, ASTM International, 2003			

9. Correlation of the course contents with the demands of the epistemic community representatives, professional associations and representative employers in the field of the program

The course syllabus was developed in cooperation with representatives of engineering companies in Ploiești and Bucharest that have hired graduates of similar master programs.

10. Evaluation

Activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percentage of final grade
10.4. Course	The evaluation considers the following categories knowledge: -theoretical knowledge evaluated by questions on topics presented in the course	Written examination. In order to take into account the score obtained at the presentation of the paper, the student must obtain at least half of the grade announced in the written test.	60%
10.5. Seminar / laboratory /	General knowledge of analysed petroleum products, assessed by questions related to the subject of the laboratory work	Assessment of laboratory activity; Active participation in laboratory activities; Drawing up the reports and interpreting the results of the experimental part	10%
	Advanced knowledge of the methods of analysis used and the framing of the oil products analysed in the quality standards.	The evaluation of the laboratory reports, questions about the obtained results.	10%
	Presenting a paper on the topic of the course with a theme chosen by the student; the ability to process the collected information, the analysis and the synthesis thereof.	Oral presentation; presentation of documents, discussions and analyses on case studies presented	20%
10.6. Project			
10.7. Minimum performance standard			
<ul style="list-style-type: none"> ➤ Minimum knowledge of the main characteristics of the raw materials used in the oil refining industry, respectively of the products obtained. ➤ Minimum knowledge of the chemical composition data of the raw materials used in the oil refining industry, respectively, of the products obtained. ➤ Minimal knowledge of quality standards and induced implications. ➤ Students have to address every issue in the exam subject. ➤ To receive the note on the report, the student will have to present it at the seminar. ➤ Access to the exam in the first session is conditioned by attending at least 75% of the total course hours and performing all laboratory work. 			