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 Engineering and Environmental Protection
1.4. Field of study	Chemical Engineering
1.5. Study cycle	Master
1.6. Study program	Chemical Engineering for Refineries and Petrochemistry

2. Course information

2.1. Course title	Bio-resources
2.2. Course coordinator	Prof. PhD. Chem. Sirbu Elena Emilia
2.3. Laboratory / seminar / coordinator	Prof. PhD. Chem. Sirbu Elena Emilia
2.4. Project coordinator	
2.5. Year of study	1
2.6. Semester *	2
2.7. Evaluation type	V
2.8. Course type - formative category **/ Type of subject matter ***	SC/OPT

* The semester number is according to the curriculum.

** FC – Fundamental courses; SC – Specialization courses; CC – Complementary courses.

*** Mandatory/imposed = MND; Optional = OPT; Elective = ELE.

3. Total estimated time (teaching hours per semester)

3.1. Number of hours per week	3	of which: 3.2. course	2	3.3.Seminar/laboratory	1	3.4.Project	
3.5. Total hours from curriculum	42	of which: 3.6. course	28	3.7. Seminar/laboratory	14	3.8. Project	
3.9. Total hours of individual study (Study of textbook, course support, bibliography, study of textbook, course support, further reading in the library, on online platforms, preparing seminars/laboratories, homework, portfolios and essays)							138
3.10. Total hours per semester							180
3.11. Number of credits							6

4. Requirements (where applicable)

4.1. Curriculum requirements	Graduated bachelor
4.2. Course requirements:	Course room equipped with video projector and screen
4.3.Seminar/Laboratory requirements:	Laboratory equipped specific with related infrastructure

5. Specific competences acquired and learning achievements* outcomes

Professional competences	**Learning achievements***
1. Integrates principles of sustainable development and circular economy	**K1** - The student identifies reasoning models applicable in interdisciplinary contexts. **S1** - The student applies methods of analysis and synthesis to solve complex problems. **S2** - The student uses modern tools for decision evaluation and substantiation. **LO1** - The student takes responsibility for the proposed solutions and their impact. **LO2** - The student demonstrates autonomy in the critical approach of complex situations.
Transversal competences	**Learning achievements***
1. Develops critical thinking and the ability to solve complex problems	**K1** - The student describes advanced concepts of sustainable development applicable in chemical engineering. **S1** –The student evaluates the environmental impact of chemical processes. **S2** - The student proposes technological solutions for pollution reduction and energy efficiency. **LO1** –The student makes decisions in accordance with environmental legislation and sustainability principles. **LO2** - The student promotes ethical conduct in resource use.

* K – knowledge; S – skills; LO – responsibility and autonomy.

6. Course objectives (derived from the list of specific competences acquired)

6.1. General objective	Organic chemistry, Environmental Protection
6.2. Specific objectives	basic knowledge of using computer technologies for data acquisition, data processing and documentation

7. Contents

7.1. Course	Time	Teaching methods	Comments
Cellulose. Molecular structure, physical and chemical characteristics, resources. Directions of utilization by chemical modification (hydrolysis, obtaining cellulose esters and ethers).	4	Lecture, debate and problematization	
Lignin. Molecular structure, physical and chemical properties, resources, toxicologists. Commercial lignin. Directions of utilization by chemical modification. Economic aspects.	4		
Natural resins. Types, methods of obtaining, uses, toxicology. Economic aspects.	4		
Natural fats. Types, physical and chemical properties, resources, methods of obtaining, methods of analysis, toxicology. Processing for the purpose of obtaining raw materials. Environmental protection. Economic aspects.	4		
Bioglycerol. Physical and chemical properties, resources, methods of obtaining,	4		

methods of analysis, toxicology. Recovery and purification. Processing for the purpose of obtaining petrochemical raw materials. Environmental protection. Economic aspects.			
Starch. Molecular structure and composition. Chemical modification processes. Uses. Physically or chemically modified starch. Economic aspects.	4		
Biogas. Physical characteristics, raw materials, production technologies, methods of analysis, toxicology. Recovery and purification. Processing for the purpose of obtaining petrochemical raw materials. Environmental protection. Economic aspects.	4		
Bibliography Manas Chanda, Introduction to Polymer Science and Chemistry. A Problem-Solving Approach, 2013 by Taylor & Francis Group;			
7.2. Seminar / laboratory	Time	Teaching methods	Comments
Synthesis of ethyl esters from vegetable oil	4	debate and problematization	
Synthesis of glycerol acetals	4		
Synthesis of carboxylic acid amides	3		
Studies on the stability of biomass suspensions	3		
Bibliography Willey-VCH, Ullmann's Encyclopedia of Industrial Chemistry, Sixth Edition, 2002;			
7.3 Project	Time	Teaching methods	Comments
Bibliography			

8. 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 content of the laboratory work corresponds to the curricula of other university centers in the country. In order to better adapt the content of the discipline to the requirements of the labor market, meetings were held with representatives of economic partners, with graduates, as well as with representatives of teaching staff from faculties that have the same specialization.

9. Evaluation

Activity	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Percentage of final grade
9.4. Course	- correctness and completeness of the acquired knowledge; - logical coherence; - degree of assimilation of the specialized language;	Oral exam with theoretical topics and applications	60%
	- interest in individual study	Elaboration of a literature review	30%

	and professional development.	on the course topic	
9.5. Seminar/laboratory	- activity in the laboratory.		10%
9.6. Project			
9.7. Minimum performance standard			
➢ The student must demonstrate minimal knowledge of the specific aspects required by the content of the subject sheet			

Signature/date	Course coordinator	Laboratory coordinator	Project coordinator
22.09.2025	Prof. PhD. Chem. Sirbu Elena Emilia	Prof. PhD. Chem. Sirbu Elena Emilia	

Date of approval in the department	Head of department	Dean
26.09.2025	Assoc. prof. PhD. Eng. Neagu Mihaela	Assist. prof. PhD. Eng. Duşescu-Vasile Cristina