COURSE SYLLABUS

1. Program information

1.1. Institution	Petroleum-Gas University of Ploieşti
1.2. Faculty	Petroleum Refining and Petrochemistry
1.3. Department	Petroleum Processing Engineering and Environmental Protection
1.4. Field of study	Chemical engineering
1.5. Study cycle	Master Degree
1.6. Study program	Chemical Engineering for Refineries and Petrochemistry (in English)

2. Course information

2.1. Course title	Risk engineering in petroleum processing industry
2.2. Course coordinator	Prof.PhD.eng. Marius Gabriel Petrescu
2.3. Laboratory / seminar / coordinator	Prof.PhD.eng. Marius Gabriel Petrescu
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 ***	DS

* 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							42
3.11. Number of credits							6

4. Requirements (where applicable)

4.1. Curriculum requirements	➢ Process modeling, simulation and optimization
4.2. Course requirements:	➢ teaching at the blackboard with graphic representations made with chalk in parallel with the use of multimedia techniques (computer-video projector, course support in electronic format, video examples) ➢ use the computer network for debates and case studies
4.3.Seminar/Laboratory requirements:	➢ room equipped with video projector or smart board. ➢ computer network.

5. Specific competences acquired and learning achievements* outcomes

Professional competences	**Learning achievements***
1. Integrates principles of sustainable development and circular economy	**K1** - The student/graduate describes, identifies and summarizes fundamental concepts regarding sustainable development **S1** - The student/graduate evaluates the impact of chemical processes on the environment **S2** - . The student/graduate interprets and explains the issues specific to the circular economy. **LO1** - The student makes decisions in accordance with environmental legislation and sustainability principles. **LO2** - The student promotes ethical conduct in the use of resources.
2. Uses advanced techniques of analysis and quality control	**K1** - The student/graduate describes, identifies and summarizes fundamental concepts of design, operation and optimization of petrochemical equipment **K2** - The student/graduate explains and interprets technical documentation specific to the design of petrochemical processes **S1** - The student/graduate selects and applies specific scientific methods and techniques in the development of technical/technological risk analyses for chemical processes and analyzes the level of scientific documentation and the potential advantages and disadvantages of the proposed methods and procedures. **S2** - The student/graduate interprets and explains the problems of coordination and implementation of technical/technological risk strategies **LO1** - The student/graduate develops work and communication skills for effective collaboration in carrying out tasks specific to chemical engineering **LO2** - The student/graduate is aware of aspects of social responsibility and professional ethics.
Transversal competences	**Learning achievements***
1. Develops critical thinking and the ability to solve complex problems	**K1** - The student/graduate describes and identifies methods and techniques of critical analysis. **K2** - The student/graduate identifies reasoning models applicable in an interdisciplinary context. **S1** - The student/graduate uses modern tools for evaluating and substantiating decisions. **LO1** - The student/graduate develops work and communication skills for effective collaboration in carrying out tasks specific to chemical engineering **LO2** - The student/graduate assumes responsibility for the proposed solutions and their impact
2. Manages projects and resources in a complex socio-economic context	**K1** - The student/graduate explains and applies risk assessment methods **S1** - The student/graduate applies risk management tools and techniques **LO1** - The student assumes responsibility for decisions regarding project implementation **LO2** - The student demonstrates autonomy and leadership in managing resources and teams

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

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

6.1. General objective	Students will acquire the basic concepts related to the identification, quantification, prioritization, treatment and monitoring of

	technical/technological risks.
6.2. Specific objectives	After completing the course, students will be able to: - Document a technological process in terms of socio-economic implications; - Evaluate the risks associated with technological equipment/processes; - Apply specific risk management methods; - Apply specific techniques and tools for technological risk assessment.

7. Contents

7.1. Course	Time	Teaching methods	Comments
1. Basics of sustainable development. Concepts. Definitions. Trends. 2. General aspects of risk management 3. Technical/technological risk 4. Identification of technical/technological risks 5. Risk analysis 6. Risk reduction 7. Risk monitoring	4 4 4 4 4 4 4	Teaching will focus on engaging students in discussing the specific issues of the course with the identification of aspects derived from previous subjects. Multimedia techniques are used (computer-video projector, electronic course support, video examples)	

Bibliography

1. Petrescu, M. G., Managementul sistemelor de producţie, Editura Universităţii din Ploieşti, Ploieşti, 2004;
2. Nae I., Petrescu M.G., Lupu F, Managementul Cercetării-Dezvoltării-Inovării, Ed. ILEX, București, 2009;
3. Marius Gabriel Petrescu*, Adrian Neacșa, Eugen Laudacescu & Maria Tănase, Energy in the Era of Industry 5.0—Opportunities and Risks, in book Industry 5.0 - Creative and Innovative Organizations, pg. 71-90, Spinger, https://doi.org/10.1007/978-3-031-26232-6_4, 2023
4. PETRESCU M.G., Managementul tehnologiilor industriale, Editura Universității Petrol-Gaze din Ploiești, ISBN 978-973-719-768-9, 2019.
5. Ionescu, R., Panait, M., Dollija, E., Petrescu, M.G. (2024). Toward a Sustainable and Equity Future: Navigating the Crossroads of Europe's Energy Sector. In: Seifi, S., Crowther, D. (eds) Equity and Sustainability. Approaches to Global Sustainability, Markets, and Governance. Springer, Singapore. https://doi.org/10.1007/978-981-97-4742-9_8, 2024.
6. Toader L., Petrescu M.G., Ilinca C., Risc, calitate şi management de mediu, Editura Univ. Petrol-Gaze din Ploieşti, 2008;

7.2. Seminar / laboratory	Time	Teaching methods	Comments
1. Problem formulation (identification of the factual situation). 2. Process description 3. Risk identification, ranking and analysis. 4. Risk reduction solutions 5. Risk monitoring	1 3 4 3 3	Applications, case studies based on real situations are proposed. Students will organize themselves into working groups. The solutions proposed by each group are evaluated by comparing them with the solutions of the other groups.	

Bibliography

1. *Marius Gabriel PETRESCU*, Mirela PANAIT, Hailong FU, Integrated Management Systems Under the Banner of Sustainable Development: Risks and Opportunities, Sustainable Management for Managers and Engineers,

pg. 157-188, ISBN 978-1-78630-439-1, ISTE Ltd and John Wiley & Sons, 2021
2. Hailong FU, Yue WANG, Marius Gabriel PETRESCU, Mirela PANAIT, Competency Cultivation of Mechanical Engineers in the Process of Social Sustainable Development, Sustainable Management for Managers and Engineers, pg. 53-66, ISBN 978-1-78630-439-1, ISTE Ltd and John Wiley & Sons, 2021
3. *Marius Gabriel Petrescu*, Costin Ilinca, Maria Tanase, and Hailong Fu, Management of Industrial Technologies, in Mechanical and Industrial Engineering - Historical Aspects and Future Directions, ISSN 2195-0911 ISSN 2195-092X (electronic) Materials Forming, Machining and Tribology ISBN 978-3-030-90486-9 ISBN 978-3-030-90487-6 (eBook) https://doi.org/10.1007/978-3-030-90487-6, Springer, 179-210, 2022
4. PETRESCU M.G., Managementul tehnologiilor industriale, Editura Universității Petrol-Gaze din Ploiești, ISBN 978-973-719-768-9, 2019

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

Training of managerial skills required by the economic environment for technological engineers, regarding the evaluation and diagnosis of industrial systems. The content of the discipline correlates with the requirements declared by the representatives of the economic environment during bilateral meetings and visits to industrial institutions

9. Evaluation

Activity	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Percentage of final grade
9.4. Course	Mid-term knowledge check	Discussions during teaching Case studies	30%
	Final check		30%
9.5. Seminar/laboratory		Group topics	40%
9.6. Project			
9.7. Minimum performance standard			
➢ Mastering the concepts related to the design and evaluation of technologies. ➢ Correct use of the concept of technological management risk. ➢ Mastering the concept related to the sustainable development of the enterprise			

Signature/date Course coordinator Laboratory coordinator Project coordinator

17.09.2025

Date of approval in the department
26.09.2025

Head of department
Assoc. prof. PhD. Eng.
Neagu Mihaela

Dean
Assist. prof. PhD. Eng. Duşescu-Vasile Cristina