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

2. Course information

2.1. Course title	3D Plant Design in the Chemical Industry		
2.2. Course coordinator	Professor PhD. Eng. Cursaru Diana-Luciana		
2.3. Laboratory / seminar coordinator	Professor PhD. Eng. Cursaru Diana-Luciana		
2.4. Project coordinator	Assist. PhD. Eng. Matei Dănuța		
2.5. Year of study	II		
2.6. Semester *	3		
2.7. Evaluation type	Exam		
2.8. Course type - formative category **	DA	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	7	of which: 3.2. course	3	3.3. Seminars/laboratories	2	3.4 Project	2
3.5Total hours from curriculum	70	of which: 3.6. course	30	3.7Seminars/laboratories	20	3.8 Project	20

3.9Time distribution	hours
Study of textbook, course support, bibliography and notes	10
Further reading in the library, on online platforms and fieldwork	-
Preparing seminars/laboratories, homework, portfolios and essays	5
Tutoring	-
Examinations	5
Other activities	

3.10. Total hours of individual study	20
3.11. Total hours per semester	90
3.12. Number of credits	5

4. Prerequisites (where applicable)

4.1. of curriculum	➢ Knowledge of mathematic ➢ Knowledge of chemical engineering ➢ Knowledge of mechanical engineering
4.2. of skills	Knowledge of the concepts of the plant design in the chemical industry

5. Requirements (where applicable)

5.1. of course	➢ Room equipped with video projector
5.2. of seminars/laboratory	➢ Room equipped with video projector and computers with specific softwares for 3D design)

6. Specific competences

Professional competences	PC1. Description, analysis and advanced utilization of engineering concepts and fundamental theories in petroleum refining. PC2. Characterization of physical and chemical structural properties, of petroleum products by complex analytic methods. PC3. Equipment, process and plant design. PC4. Real time control of processes and plants in chemical industry. PC5. Modeling, simulation and design of chemical processes.
Cross-curricular competences	TC1. Documentation, information and scientific literature research. TC2. Independent and autonoms achievement of individual professional tasks. TC3. Advanced knowledge of computer, internet and specific chemical engineering software. TC4. Management organization and planning of professional teams and organizations.

7. Course objectives (based on the competence grid)

7.1. General objective	At the end of the course the student will have basic knowledge on the 3D design of the equipment specific to the chemical industry and the chemical industry facilities. Throughout the course, knowledge transfer will be made on the use of the PDMS_AVEVA simulator in the design of chemical industry equipment.
7.2. Specific objectives	After completing the discipline students will be able to: Understand and identify correctly the concepts used in the design; Know and interpret the structure of the model of a design problem; Choose and develop a 3D design method. Have the ability to evaluate, explain and interpret the processes that are the subject of design;Have the ability to analyze and interpret the optimal solutions of a design problem.Have the ability to formulate opinions and to persevere for the purpose of professional self-improvement.

8. Contents

8.1. Course	Time	Teaching methods	Comments
1. Design methodology (investment stages and related design documentation)	5	Interactive, based on multimedia and student-centered techniques	Recommended course and recommended bibliography
2. Basis of design (types of technological schemes)	5		
3. Project design (criteria and ways of designing technological schemes: operating regime, operating flexibility, energy saving, technological multifunction, capacity enhancement and process development and	5		

technological process integration - environmental protection)			
4. Equipment and piping assembly (machine installation principles, piping installation systems, mounting plans, thermal and thermal insulation of pipelines and equipment).	5		
5. 3D design of a plant. Coupling of projected equipment	5		
6. Making the isometric scheme of a projected plant	5		
Bibliography 1. Silla, H., Chemical Process Engineering. Design and Economics, Ed. By Dekker, New York, 2003 2. Towler, G., Sinnott, R., Chemical Engineering Design, Ed. Elsevier, New York, 2007 3. Baasel, W., Preliminary Chemical Engineering Plant Design, Elsevier, New York, 2008 4. Coulson, J.M., Richardson., J.F., Chemical Engineering, Pergamon Press, Oxford, 1979 5. AVEVA Plant Hands On Overview 6. AVEVA Plant Drawing Production			
8.2. Seminar / laboratory	Time	Teaching methods	Comments
1. Designing equipment with primitives in the AVEVA_PDMS library	4	Interactive, based on multimedia and and design software such as AVEVA_PDMS.	
2. Design of a steel structure made of columns and stiffening beams. Filling with curved beams	4		
3. Designing a tubing support	4		
4. Designing a platform	4		
5. Designing an Access Stair	4		
Bibliography AVEVA Plant Pipework modelling			
8.3. Project	Time	Teaching methods	Comments
3 D design of a plant from chemistry and petrochemistry industry.	20	Interactive, based on multimedia and and design software such as AVEVA_PDMS. The master students will work in a team of 3-4 people, each member of the team being responsible for designing an area.	A real schema is being used from a refinery
Bibliography 1. AVEVA Plant Pipework modelling 2. AVEVA Plant Drawing Production 3. AVEVA Plant Structural Modelling			

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	Formation of the necessary rationale base for modeling activity of chemical engineering structures	Final exam containing a written and practical test for assessing the knowledge on modeling of a chemical industry specific structure.	40%
	Frequency to the course	Presence at the course, participation in debates, stimulation of critical thinking	5 %
10.5. Seminar / laboratory	Application of the fundamental knowledge of the discipline in the design activity and the realization of the models following the schemes of the installations	Presentation of the models made during the laboratory hours.	15 %
10.6. Project	Presentation of the 3D scheme of a plant in the chemical and petrochemical industry.	The presentation of the project will be done by the entire team that worked through a question-and-answer presentation based on the 3D scheme.	40 %
10.7. Minimum performance standard			
➢ Participation to all laboratories. ➢ Realization of the model of a structure specific to the chemical industry ➢ Presentation of the project representing the 3D scheme of a plant specific to the chemical and petrochemical industry ➢ All exam subjects should be evaluated with a minimum of 5 from 10.			