COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Environmental Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Pollution Prevention and Sustainable Technologies**			
2.1.2 Course code				MINQUI01-1-014	2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Salvador Ordóñez García			
2.3 Course instructors for applied activities (S, L, P, Pr)				Laura Faba Peón			
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.5	3.3a sem.		3.3b laboratory		3.3c project	1	3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	21	3.6a sem.		3.6b laboratory		3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	35
Practical skills development	23
Preparation of seminars / laboratory works / project phases / home works / presentations	25.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector

6. Overall objective of the course

The course aims to provide students with knowledge about strategies for pollution reduction in chemical processes, as well as the fundamentals of green chemistry and engineering. Industry experts will be invited to provide practical insights into how these principles are implemented in real-world scenarios.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Be aware of assessment and evaluation of process design alternatives with respect to process safety and environmental impact, aiming to promote a sustainable development.
Skills	The student / graduate will: 2. Be able to apply core chemical engineering knowledge, together with creativity and critical thinking, to develop design alternatives to process units in order to minimize the environmental impact of the overall process. 3. Be able to apply Green Chemistry and Clean Technology approaches to environmental impact minimization of a manufacturing process.
Responsibility and autonomy	The student / graduate will: 4. Be competent in the synthesis and integration of the different elements of a process flowsheet, in order to minimize the overall environmental impact of the facility.

8. Teaching methods

The lectures will include theoretical and practical activities imparted by the lecturer and using the material previously given to students. Seminars will be mainly practical activites with a high and active participation of students. At the beginning of the course, students recieve a copy of all the material that will be used during the sessions, and the problems that must be solved as individual or group work. The lectures will be complemented with activities in collaboration with industry experts to provide practical insights on the application of pollution prevention principles.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction. Corrective and preventive approaches. Legal aspects (IPPC, REACH, etc.). Sustainability: concept and metrics.	Interactive lecture. Clarifying explanations. Conferences of professionals in the field.	2 hours
9.1.2. Environmental impact assessment of the chemical processes.		2 hours
9.1.3. Methodology of pollution prevention: prevention plans.		2 hours
9.1.4. Application of the Principles of Green Chemistry to the chemical industry. Strategies to minimize the environmental impact of a chemical reaction.		2 hours
9.1.5. Pollution prevention in the raw materials selection: decarbonization and hydrogen economy.		2 hours
9.1.6. Pollution prevention by integration of chemical processes: Flow diagrams analysis and industrial ecology.		2 hours
9.1.7. Reactors design for pollution prevention.		2 hours
9.1.8. Pollution prevention in separation units.		2 hours
9.1.9. New technologies for pollution prevention: process intensification.		1 hours
9.1.10. Case studies of pollution prevention: pharmaceutical, paper-mill, carbochemical plants.		4 hours
Course bibliography: *Books:* D.T. Allen, D.R. Shonnard, "Green Engineering: Environmentally Conscious Design of Chemical Processes", Prentice Hall (2002) N.P. Cheremisinoff, P. Rosenfeld, "Responsible Care: A new strategy for pollution prevention and waste remediation through Environmental Management" Gulf Pub (2008) F. Cavani, G. Centi, S. Perathoner, "Sustainable Industrial Chemistry" WileyVCH (2009) A.E. Martel-Parrish, "Green Chemistry and Engineering", Wiley-AIChE (2014) A.P. Rossiter, "Waste minimization through Process Design", Mc Graw Hill (1995) M. Lancaster "Green Chemistry: An introductory text", Ed. RSC (2002)		

9.2a Project	Working methods [16]	Time allocation
Practical case projects on the implementation of pollution prevention principles on industrial processes, addressing: - impact assessment. - integration of chemical processes, and reactor and separation design for pollution prevention.	Discuss and work on practical case projects.	14 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	60%
10.5a Project	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	40%

10.6 Conditions for passing

Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Seminar, at least, 5 points.
The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Salvador Ordóñez García

Course instructors for applied activities: Laura Faba Peón

Date of approval by the department: Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council: Dean: José Javier Borge Álvarez