Proyecto docente de la asignatura

Course/ Asignatura	Strategy in Chemical Engineering Processes / Estrategia en Ingeniería de Procesos Químicos		
Unit / Materia	Advanced Process Design / Diseño Avanzado de Procesos		
Module / Módulo	Intensification / Intensificación		
Degree / Titulación	Master in Chemical Engineering/ Máster en Ingeniería Química		
Plan Code / Plan	542	**Código**	53754
Period/ Periodo de impartición	1st Semester / 1er CUATRIMESTRE	**Tipo/Carácter**	OP
Level/Cycle / Nivel/Ciclo	MASTER	**Curso**	2
ECTS credits / Créditos ECTS	6.0 ECTS		
Language / Lengua en que se imparte	ENGLISH / INGLÉS		
Staff / Profesor/es responsable/s	RAFAEL MATO CHAÍN FIDEL MATO CHAÍN		
Contact / Datos de contacto (E-mail, teléfono…)	rbmato@iq.uva.es, 983 423 177 fidel@iq.uva.es, 983 423 169		
Tutoring Schedule / Horario de tutorías	Monday, Tuesday and Wednesday from 12:00 to 14:00. It is recommended to make an appointment. / Lunes, Martes y Miércoles de 12:00 a 14:00. Recomendable concertar cita.		
Department / Departamento	Ingeniería Química y Tecnología del Medio Ambiente [Edificio Residencia Alfonso VIII]		

1. Situación / Sentido de la Asignatura

1.1 Contextualization

This elective course is a deeper insight into modern strategy techniques for process design, analysis and revamping.

1.2 Relationship with other subjects

Basic knowledge of process simulation with HYSYS is required for course development.

1.3 Prerequisites

2. Learning outcomes

2.1 Basic

CG01. Ability to apply the scientific method and principles of engineering and economics to formulate and solve complex problems in processes, equipment, facilities and services, where matter changes its composition, state or energy content, characteristic of the Chemical industry and other related sectors, including pharmaceuticals, biotechnology, materials, energy, food and the environment.

CG02. Devise, project, calculate, and design processes, equipment, industrial facilities and services in the field of chemical engineering and related industrial sectors in terms of quality, safety, economy, rational and efficient use of natural resources, and environment preservation.

CG04. Perform appropriate research, design and lead the development of engineering solutions, in new or uncertain environments, relating creativity, originality, innovation and technology transfer.

CG05. To know how to establish mathematical models and develop them by means of appropriate informatics, as scientific and technological basis for the design of new products, processes, systems and services, and for the optimization of others already developed.

CG06. To be able to analyse and synthesize the continuous progress of products, processes, systems and services using criteria of safety, economic viability, quality and environmental management.

CG07. Integrate knowledge and face the complexity of making judgments and decision making, based on incomplete or limited information, including reflections on the social and ethical responsibilities of professional practice.

CG09. Communicate and discuss proposals and conclusions in multilingual, specialized and non-specialized forums, in a clear and unambiguous way.

CG10. Adapt to changes, being able to apply new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit.

CG11. To possess the abilities of the autonomous learning to maintain and to improve the own competences of the chemical engineering that allow the continuous development of the profession.

2.2 Specific

CEP18. To identify the fundamental aspects of the processes that determine its viability.

CEP19. To know the techniques for developing an integrated process from restricted information.

3. Aims

- Identify, asses and evaluate possibilities for chemical process revamping.
- Design and optimize Heat Exchanger Networks.

4. Thematic blocks

Block 1: Process revamping

Workload in ECTS credits: 3.0

a. Contextualization and justification

(see section 1.1)

b. Learning objectives

(see section 3)

c. Syllabus

01. An Introduction to Chemical Process Retrofitting and Revamping
02. Project Engineering and Management for Process Retrofitting and Revamping
03. Process Intensification in Process Retrofitting and Revamping
04. Retrofit of Side Stream Columns to Dividing Wall Columns, with Case Studies of Industrial Applications

d. Teaching methods

(see section 5)

e. Workplan

Week 1: Start of Process revamping section

Week 7: Assignment 1

f. Assessment

(see section 7)

g. Basic bibliography

- Chemical Process Retrofitting and Revamping: Techniques and Applications, Gade Pandu Rangaiah (Editor), Wiley, 2016
- User´s Guide HYSYS (AspenTech).
- User´s Guide Aspen Properties (AspenTech)

h. Complementary bibliography

i. Necessary resources

HYSYS and Aspen Properties software

j. Timing

(see section 4.e)

Block 2: HEN design

Workload in ECTS credits: 3.0

a. Contextualization and justification

(see section 1.1)

b. Learning objectives

(see section 3)

c. Syllabus

To develop procedures for quick, simple, humble design of operable HENs (Exchanger Networks). Also, procedures to relax/simplify/optimize existing HENs. Based on these procedures, if possible, automated software tool(s) for the job..

d. Teaching methods

(see section 5)

e. Workplan

Week 8: Start of HEN design section

Week 15: Assignment 2

f. Assessment

(see section 7)

g. Basic bibliography

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h. Complementary bibliography

i. Necessary resources

j. Timing

(see section 4.e)

5. Teaching methods

Classes are developed in the computer room in a practical way. The professor guides the class by explanations followed by the development of practical cases. Examples are provided to students to build on the knowledge acquired in the classroom.

6. Study hours

ON-SITE ACTIVITIES	HOURS	OFF-SITE ACTIVITIES	HOURS
Lectures	25	Self-study and individual work	60
Practical classes	5	Study and autonomous group work	30
Workshops	2		
Computing room classes	25		
Tutoring	2		
Assesment	1		
Total on-site	**60**	**Total off-site**	**90**

7. Evaluation system

ACTIVITY	WEIGHT ON FINAL MARK	COMMENTS
Written exam	20%	
Assignments	70%	2 Assignments
Class activity	10%	

ASSESSMENT CRITERIA
• **Ordinary exam:** o A minimum mark of 4.0 is required in the written exam to pass. • **Extraordinary exam:** o A minimum mark of 4.0 is required in the written exam to pass. o Assignments marks (70%) and class activity (10%) marks are preserved to calculate the final value.

8. Closing remarks