

**Proyecto/Guía docente de la asignatura***Project/Course Syllabus*

|                                                                                                 |                                                                                                  |                                     |       |
|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------|-------|
| <b>Asignatura</b><br><i>Course</i>                                                              | Strategy in Chemical Engineering Processes /<br>Estrategia en Ingeniería de Procesos Químicos    |                                     |       |
| <b>Materia</b><br><i>Subject area</i>                                                           | Advanced Process Design / Diseño Avanzado de Procesos                                            |                                     |       |
| <b>Módulo</b><br><i>Module</i>                                                                  | Intensification / Intensificación                                                                |                                     |       |
| <b>Titulación</b><br><i>Degree Programme</i>                                                    | Master in Chemical Engineering/ Máster en Ingeniería Química                                     |                                     |       |
| <b>Plan</b><br><i>Curriculum</i>                                                                | 542                                                                                              | <b>Código</b><br><i>Code</i>        | 53754 |
| <b>Periodo de impartición</b><br><i>Teaching Period</i>                                         | 1st Semester /<br>1er CUATRIMESTRE                                                               | <b>Tipo/Carácter</b><br><i>Type</i> | OP    |
| <b>Nivel/Ciclo</b><br><i>Level/Cycle</i>                                                        | MASTER                                                                                           | <b>Curso</b><br><i>Course</i>       | 2     |
| <b>Créditos ECTS</b><br><i>ECTS credits</i>                                                     | 6.0 ECTS                                                                                         |                                     |       |
| <b>Lengua en que se imparte</b><br><i>Language of instruction</i>                               | ENGLISH / INGLÉS                                                                                 |                                     |       |
| <b>Profesor/es responsable/s</b><br><i>Responsible Teacher/s</i>                                | DANILO ALBERTO CANTERO SPOSETTI<br>LUIS VAQUERIZO MARTÍN<br>ALBERTO MORO LOBO (Profesor Externo) |                                     |       |
| <b>Datos de contacto (E-mail, teléfono...)</b><br><i>Contact details (e-mail, telephone...)</i> | danilo.cantero@uva.es, 983 423 169<br>luis.vaquerizo@uva.es 983 186 512                          |                                     |       |
| <b>Departamento</b><br><i>Department</i>                                                        | Ingeniería Química y Tecnología del Medio Ambiente                                               |                                     |       |
| <b>Fecha de revisión por el Comité de Título</b><br><i>Review date by the Degree Committee</i>  | 13-07-2026                                                                                       |                                     |       |

En caso de guías bilingües con discrepancias, la validez será para la versión en español.  
*In the case of bilingual guides with discrepancies, the Spanish version will prevail.*



## 1. Situación / Sentido de la Asignatura

### *Course Context and Relevance*

### 1.1 Contextualización

#### *Course Context*

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

### 1.2 Relación con otras materias

#### *Connection with other subjects*

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

### 1.3 Prerrequisitos

#### *Prerequisites*

**2. Resultados del proceso de formación y de aprendizaje (RD 822/2021) o competencias (RD 1393/2007)*****Learning outcomes (RD 822/2021) or competences (RD 1393/2007)*****2.1 (RD1393/2007) Competencias Generales*****General Competences***

- 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 (RD1393/2007) Competencias Específicas*****Specific Competences***

- 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. Objetivos

### ***Course Objectives***

- Identify, asses and evaluate possibilities for chemical process revamping.
- Acquire a wide-process approach to energy systems retrofits with an emphasis on feasibility and efficiency.



**4. Contenidos y/o bloques temáticos****Course Contents and/or Modules****Bloque 1: Process integration**

Carga de trabajo en créditos ECTS: 4.0  
Workload in ECTS credits:

**a. Contextualización y justificación****a. Context and rationale**

(see section 1.1)

**b. Objetivos de aprendizaje****b. Learning objectives**

(see section 3)

**c. Contenidos****c. Contents**

01. Chemical Process Retrofitting and Revamping
02. Process Integration and Project Engineering and Management
03. Process Intensification

**d. Métodos docentes****d. Teaching and Learning methods**

(see section 5)

**e. Plan de trabajo****e. Work plan**

- Week 1: Start of Process integration section  
Week 7: Assignment 1

**f. Evaluación****f. Assessment**

(see section 7)

**g Material docente****g Teaching material****g.1 Bibliografía básica****Required Reading**

- 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)



## g.2 Bibliografía complementaria

### Supplementary Reading

## g.3 Otros recursos telemáticos (píldoras de conocimiento, blogs, videos, revistas digitales, cursos masivos (MOOC), ...)

### Additional Online Resources (microlearning units, blogs, videos, digital journals, massive online courses (MOOC), etc.)

The course Web page on Campus Virtual includes links to the videos with the theoretical contents of the subject. Access to the software is guaranteed for students enrolled in the IEE computer classrooms and at home via remote access software.

## h. Recursos necesarios

### Required Resources

- Course material will be available in the virtual classroom: class notes, wordings and solutions of exams/exercises, videos ...
- Commercial software. Since this software is licensed by the UVa, students agree to use it exclusively for the activities of the course, not being allowed to use it for other purposes. If you plan to use it in any research activity, you must previously inform the teacher responsible, indicating if there is any company or third party involved.

## i. Temporalización

### Course Schedule

(see section 4.e)

## Bloque 2: Energy systems

Carga de trabajo en créditos ECTS: 2.0  
Workload in ECTS credits:

### a. Contextualización y justificación

#### a. Context and rationale

(see section 1.1)

### b. Objetivos de aprendizaje

#### b. Learning objectives

(see section 3)

### c. Contenidos

#### c. Contents

Case-based analysis of energy integration systems possibilities, the criteria influencing design choices and their impact on other process systems.

### d. Métodos docentes

#### d. Teaching and Learning methods



(see section 5)

A case approach based on Pinch Technology complemented with process optimization is followed, based on a discussion and collaborative teaching methodology.

#### e. Plan de trabajo

#### *e. Work plan*

Week 8: proposal and discussion of a case each week

Week 14: Assignment 2

#### f. Evaluación

#### *f. Assessment*

(see section 7)

#### g Material docente

#### *g Teaching material*

##### g.1 Bibliografía básica

##### *Required Reading*

##### g.2 Bibliografía complementaria

##### *Supplementary Reading*

##### g.3 Otros recursos telemáticos (píldoras de conocimiento, blogs, videos, revistas digitales, cursos masivos (MOOC), ...)

*Additional Online Resources (microlearning units, blogs, videos, digital journals, massive online courses (MOOC), etc.)*

The course Web page on Campus Virtual includes links to the videos with the theoretical contents of the subject.

#### h. Recursos necesarios

#### *Required Resources*

#### i. Temporalización

#### *Course Schedule*

(see section 4.e)

### 5. Métodos docentes y principios metodológicos

### *Instructional Methods and guiding methodological principles*

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. Tabla de dedicación del estudiantado a la asignatura

**Student Workload Table**

| <b>ACTIVIDADES PRESENCIALES o PRESENCIALES o A DISTANCIA<sup>(1)</sup></b><br><i>FACE-TO-FACE/ ON-SITE or ONLINE ACTIVITIES<sup>(1)</sup></i> | <b>HORAS</b><br><i>HOURS</i> | <b>ACTIVIDADES NO PRESENCIALES</b><br><i>INDEPENDENT / OFF-CAMPUS WORK</i> | <b>HORAS</b><br><i>HOURS</i> |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------|------------------------------|
| 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 presencial <i>Total face-to-face</i>                                                                                                    | <b>60</b>                    | Total no presencial. <i>Total non-face-to-face</i>                         | <b>90</b>                    |
| TOTAL presencial + no presencial <i>Total</i>                                                                                                 |                              |                                                                            | <b>150</b>                   |

- (1) Actividad presencial a distancia es cuando un grupo sentado en un aula del campus sigue una clase por videoconferencia de forma síncrona, impartida por el profesor. *Distance face-to-face activity refers to a situation in which a group of students, seated in a classroom on campus, attends a class via live videoconference delivered by the instructor in real time.*

**7. Sistema y características de la evaluación****Assessment system and criteria**

| <b>INSTRUMENTO/PROCEDIMIENTO</b><br><i>ASSESSMENT METHOD/PROCEDURE</i> | <b>PESO EN LA NOTA FINAL</b><br><i>WEIGHT IN FINAL GRADE</i> | <b>OBSERVACIONES</b><br><i>REMARKS</i> |
|------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------|
| Written exam                                                           | 20%                                                          |                                        |
| Assignments                                                            | 70%                                                          | 2 Assignments                          |
| Class activity                                                         | 10%                                                          |                                        |

**CRITERIOS DE CALIFICACIÓN ASSESSMENT CRITERIA**

- **Ordinary exam:**
  - A minimum mark of 4.0 is required in the written exam to pass.
  - A minimum global mark of 5.0 is required to pass.
- **Extraordinary exam:**
  - The student can choose between two options: 1) the same criteria as in the ordinary exam, or 2) Written exam with 100% weight on final mark (minimum mark of 5.0 is required in this case to pass).

(\*) Se entiende por convocatoria extraordinaria la segunda convocatoria.

RECORDATORIO El estudiante debe poder puntuar sobre 10 en la convocatoria extraordinaria salvo en los casos especiales indicados en el Art 35.4 del ROA 35.4. "La participación en la convocatoria extraordinaria no quedará sujeta a la asistencia a clase ni a la presencia en pruebas anteriores, salvo en los casos de prácticas externas, laboratorios u

(\*)The term "second exam session (extraordinary/resit)" refers to the second official examination opportunity.

REMINDER Students must be assessed on a scale of 0 to 10 in the extraordinary session, except in the special cases indicated in Article 35.4 of the ROA: "Participation in the extraordinary exam session shall not be subject to class attendance or participation in previous assessments, except in cases involving external internships, laboratory work, or other



otras actividades cuya evaluación no fuera posible sin la previa realización de las mencionadas pruebas.”

[https://secretariageneral.uva.es/wp-](https://secretariageneral.uva.es/wp-content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf)

[content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf](https://secretariageneral.uva.es/wp-content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf)

*activities for which evaluation would not be possible without prior completion of the aforementioned components.”*

[https://secretariageneral.uva.es/wp-](https://secretariageneral.uva.es/wp-content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf)

[content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf](https://secretariageneral.uva.es/wp-content/uploads/VII.2.-Reglamento-de-Ordenacion-Academica.pdf)

## 8. Consideraciones finales

*Final remarks*



