Universidad Zaragoza

Year : 2019/20

27222 - Chemical Industry: Processes, Hygiene and Safety

Syllabus Information

Academic Year: 2019/20
Subject: 27222 - Chemical Industry: Processes, Hygiene and Safety
Faculty / School: 100 -

Degree: 452 - Degree in Chemistry

ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the development of the skills and capabilities for the analysis of industrial chemical processes with emphasis on raw materials and energy consumption, process design and main operation units, environmental issues, loss prevention, occupational safety and regulatory framework. A wide range of teaching and learning tasks are implemented, such as lectures, problem-solving activities, guided assignments, autonomous work and tutorials.

It is based on active participation, case studies, teamwork that also favours the development of communicative skills and critical thinking. Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other learning resources such as multimedia and solved exercises. Further details regarding the project assignment and additional information about the course will be provided on the first day of class.

4.2.Learning tasks

The 6 ECTS course includes the following learning tasks:

- Lectures (4 ECTS): 40 hours (theory sessions-and case studies whole group).
    - section I: Industrial Chemical Processes 20 hours
    - section II: Loss Prevention in the Process Industries and Occupational Safety 20 hours
- Problem-solving Sessions (2 ECTS): 20 hours (whole group)

- section I: Industrial Chemical Processes 10 hours
- section II: Loss Prevention in the Process Industries and Occupational Safety 10 hours

4.3.Syllabus

The course will address the following topics:

Section I. Industrial Chemical Processes

- Integrated Pollution, Prevention and Control in the Chemical Industry: IPPC Directive, national policy and regional regulations. BREF Documents. Best Available Techniques for the Production of Pulp. Case Study: Kraft Pulping Process in Torras Papel (Zaragoza- Spain).
- Fundamentals of flow sheeting, control and instrumentation for chemical processes. Stationary Material and Energy Balances: problems solving.
- Hydrogen production: basic data, main routes from fossil fuel and renewable energies. The H_2 economy: present and future, pros and cons.
- Synthesis Gas Production from natural gas: reactions and thermodynamics, steam reforming process, advances, autothermic reforming, novel developments, purification and adjustment of synthesis gas.
- Synthesis Gas Production from coal gasification: coal characterization, coal classification, gasification reactions and thermodynamics, main parameters, current gasification processes.
- Production of lower alkenes by steam cracking: introduction, cracking reactions, industrial process, product processing, current and future developments.
- Polyethylene production: introduction, general properties, polymerization chemistry, production processes, environmental aspects.

Section II. Loss Prevention in the Process Industries and Occupational Safety

- Types of hazards. Statistics. Risk perception. Major accident hazards.
- Flammability: definitions and basic concepts. Fires and Explosions. Estimation of consequences.
- Release of toxic and flammable substances. Estimation of concentrations.
- Industrial hygiene: introduction and main concepts. Chemical, biological and physical hazardous agents.
- Evaluation of chemical agents in the workplace. Exposure limits.
- Biological and physical agents in the workplace.
- Engineering Control: design of general and local ventilation.

4.4.Course planning and calendar

Information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the "Facultad de Ciencias website (https://ciencias.unizar.es/grado-en-quimica-0)

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=27222&year=2019