Chemical basis of engineering

Academic Year: (2020 / 2021) **Review date: 10/07/2020 14:28:36**

Department assigned to the subject: Materials Science and Engineering and Chemical Engineering Department

Coordinating teacher: OLMOS DIAZ, DANIA

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

OBJECTIVES

To understand the basic principles of Chemistry: structure and properties of matter, thermochemistry and chemical equilibrium.
To understand the basic principles of Chemical Engineering: mass balances, chemical equilibrium and reaction rates.
To introduce the main inorganic and organic products and their production processes.
To explain the reactivity of the main inorganic and organic functional groups as well as their application in industrial synthesis.
To enable students to operate simple analytical equipment, to analyse and interpret their results.
General skills encouraged during the duration of the course:
-Ability to solve complex problems
-Ability to search for, understand and use relevant information in a decision-making process
-Ability to apply multidisciplinary knowledge for resolving a specific problem
-Ability to work in a group and distribute the workload in order to solve complex problems
General skills acquired by the student:
- Ability to obtain the necessary information, knowledge or understanding in order to develop solutions for specific applications

DESCRIPTION OF CONTENTS: PROGRAMME

Atoms, Molecules and Ions. Chemical bonding.
Thermochemistry and chemical equilibrium.
Chemical Equilibrium: Acid-Base and solubility equilibriums. Electrochemistry.
Chemical Kinetics
Applied Organic and Inorganic Chemistry
Basic operations in Chemical Engineering

LEARNING ACTIVITIES AND METHODOLOGY

Master classes, tutorial classes in small groups dedicated to resolving student questions and doubts, student presentations, individual tutorials, and individual work by the students; activities dedicated to acquisition of theoretical knowledge related to the lecture course (3 ECTS credits)
Laboratory practical sessions and classes in small groups dedicated to solving question sheets, individual tutorials and individual work by the student; activities dedicated to acquisition of practical skills related to the lecture course (3 ECTS credits)

ASSESSMENT SYSTEM

% end-of-term-examination/test:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

Continuous Evaluation (mínimo 50%):
- Tests and exercises will be done in class hours (30%, distance or face-to-face sessions). It is proposed to do 6 assessment exercises during the course.
- Attendance to practical sessions and assessed practical work paper (10%)
- Participation and presentation on Projects (10%, document + oral presentation)

% end-of-term-examination/test:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

- Final Exam (50%). A minimum mark of 4.0 (out of 10) is required in this part to average with the continuous evaluation.

To pass the course a mark of 5.0 (out of 10) is required (50% Final exam + 50% Continuous evaluation).

The attendance to laboratory sessions is MANDATORY. The entrance to the laboratory is enabled once the student has watched the general security video and the specific video for chemistry/materials lab and answered both tests correctly. THE STUDENT CAN NOT ACCESS THE LABORATORY SESSIONS IF HE/SHE HAS NOT ANSWERED THE TESTS. THE NON-ASSISTANCE TO THE LABORATORY WITHOUT JUSTIFIED CAUSE IMPLIES FAILING THE CONTINUOUS EVALUATION.

For the academic year 2020-2021, laboratory sessions have been adapted to the new hybrid teaching model.

BASIC BIBLIOGRAPHY

- K. HEINZ BÜCHNER, HANS-HEINRICH MORETTO, P. WODITSCH, Industrial Inorganic Chemistry, Wiley-VCH; 2000..

- K. WEISSERMEL, HANS-JÜRGEN ARPE, Industrial Organic Chemistry, 4th Edition, Wiley & Sons; 1997..

- P.W. ATKINS, L. JONES. Chemical Principles, W H Freeman & Co, 2001.

- R. CHANG. Chemistry,, McGraw-Hill Science, 2006..