COURSE GUIDE 2025/26

Faculty 345 - Faculty of Engineering - Bilbao **Cycle** .

Degree GITECI30 - Bachelor`s Degree in Industrial Technology Engineering **Year** First year

COURSE

26571 - Chemistry **Credits, ECTS:** 6

COURSE DESCRIPTION

Chemistry is a common subject for the three following Bachelor Degrees: I) Environmental Engineering, II) Industrial Technology Engineering and III) Industrial Organization Engineering. It is inside the MO1 module (Basic subjects) in all of them.
In this subject, students will continue and delve into the concepts acquired during the high school. It is highly recommended to master the Chemistry knowledge that is part of the high school program (including the last year). It will help in the understanding of this subject. The chemistry knowledge acquired during this subject will be important in order to understand further subjects taught in higher courses of the different degrees.
In the Environmental Engineering Degree chemistry is an indispensable and essential subject.
- In the second course you can find Biology, Ecology, Geology and Edaphology that are difficult to understand without a Chemical knowledge.
- In the third course there are two subjects directly related to Chemistry: Basic Operations and Chemical and Biological Reactors.
- And in the last course there are others as Chemical Analysis and Data Quality Control, Environmental Science and Technology; plus all the optional subjects such as the Chemistry of Water, the Chemistry of the Atmospheric Pollution and Pollutants Dispersion, Gases Sampling and Analysis, etc.
Finally, in the Industrial Organization Degree and Industrial Technology Engineering, it is also a solid base for the following compulsory subjects: Chemical Technology and Environmental Science and Technology.
In the Industrial Technology Engineering, there is also a pre-intensification in Chemical Engineering and Technology, which can be chosen in the 4th year. Inside this specialization, there are subjects that can be difficult to follow without a solid Chemistry knowledge, such as Chemical Reactions and Separation and Purification Processes. This pre-intensification prepares the student to access the Master in Industrial Engineering, which also includes a specialization in Chemical Engineering, which is offered in this faculty.
Therefore, a basic but solid training in Chemistry is essential for the professional practice of the Environmental Engineers, but also in a more general way for other engineers.
It is worth mentioning that Industrial Chemical Engineering is one of the oldest specializations (with Mechanical Engineering) of the Industrial Engineering, and especially in our region, many jobs are related to this area of engineering.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

M01CM4 - Ability to understand and apply the basic knowledge principles of general chemistry, organic and inorganic chemistry and their applications in engineering.

Theoretical and Practical Contents

1. INTRODUCTION AND CHEMICAL PROPERTIES OF ORGANIC AND INORGANIC COMPOUNDS
2. THERMODYNAMIC CHEMICAL EQUILIBRIUM
3. CHEMICAL EQUILIBRIUM IN AQUEOUS CHEMICAL REACTIONS
4. LIQUID SOLUTIONS AND PHASE EQUILIBRIA

TEACHING METHODS

Individual and group methodologies will be used in order the students to develop the specified competences and acquire the corresponding learning results. One of the individual methodologies will be the master lectures. In these lectures, apart from explaining the main concepts of the subject, a wide variety of other activities will be carried out, mainly related to the formulation of practical questions by the lecturer. The lecturer will promote the involvement of the students in the solution of these practical questions, in order to improve their understanding of the theoretical concepts.
In the laboratory sessions the objective will be to carry out experiments in order to obtain the data of those processes that have been previously obtained in a theoretical way in the problems solved during the master lectures. The students will have a guide for each experimental class, where the main activities to be carried out at the lab and the experimental equipment to be used are described. Students will have to answer a number of questions before entering the lab and questions that will be given to the laboratory supervisor at the end of the experimental work. These activities will facilitate the learning process of the students.

If the health situation avoids the development of any teaching or evaluation activity, a non-presential alternative will be used and the students will be promptly informed

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	37,5		15	7,5					
Horas de Actividad No Presencial del Alumno/a	56,25		22,5	11,25					

Legend: M: Lecture-based | S: Seminar | GA: Applied classroom-based groups | GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups | TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 15%
- Additional activities 15%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Any of the two evaluations collected here are based on the following aspects: logical, orderly and legible exposition; reasoning; procedures used, results and discussion; and finally, possible conclusions.

CONTINUOUS EVALUATION
The so-called Continuous Evaluation of the subject in its ordinary call is made according to the procedure and the criteria that are exposed in this section. It consists of three different contributions:

a) Written final exam. Its content corresponds to different parts of the program of the subject. The mark obtained in it represents 70% of the final grade that appears in the record, but as long as the grade of the written final exam is greater than or equal to 5.0 (over a maximum score of 10). Otherwise, the grade obtained in the exam automatically becomes the final mark of the record.

b) Laboratory practices. The attendance is compulsory in order to deliver the reports and in order to be corrected. The grade obtained for the set of laboratory practices represents 15% of the final grade that appears in the record (on a maximum score of 10). This mark will be kept only for the ordinary and extraordinary call of the current course, regardless of the mark obtained.

c) Additional activities. The grade obtained for the set of activities carried out during the course represents 15% of the final grade that appears in the record. In such activities, the evolution of the student in the knowledge of the content of the program is valued through their degree of participation during the course, through the performance of written tests and / or other mechanisms such as the consultations carried out, or the resolution of exercises proposed, among others. Each teacher will define at the beginning of the course what they will consist of, the obligatory nature or not, the delivery terms and their percentages of evaluation. This mark will be kept only for the ordinary and extraordinary call of the current course, regardless of the obtained mark.

FINAL EVALUATION
Any student wishing to be qualified by this other procedure in the ordinary call will only have to communicate it in writing to the professor of the subject before the ninth week of the course, indicating expressly the wish to renounce to the Continuous Evaluation.
This Final Evaluation includes the following two contributions:
a) Written final exam. Its content corresponds to different parts of the program of the subject. The mark obtained in it represents 70% of the final grade that appears in the record, but as long as the grade of the written final exam is greater than or equal to 5.0 (over a maximum score of 10). Otherwise, the mark obtained automatically becomes the final mark of the record.
b) Assessments, at the discretion of the teaching team of the subject, to assess the competences developed in the additional activities and laboratory practicals. The mark obtained in this way represents 30% of the final grade.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Any of the two evaluations collected here are based on the following aspects: logical, orderly and legible exposition; reasoning; procedures used, results and discussion; and finally, possible conclusions.

CONTINUOUS EVALUATION
The so-called Continuous Evaluation of the subject in the extraordinary call includes the celebration of a new written final exam, whose qualification is established in the same terms already explained in section a) of the Continuous Evaluation in

the ordinary call. The rest of the grades obtained during the course, corresponding to the contributions indicated above in sections b) and c) of the Continuous Evaluation of the ordinary call, contribute to the final grade with the percentages already indicated in the corresponding sections.

FINAL EVALUATION
The Final Evaluation in the extraordinary call is made in the same way as in the ordinary call. Are entitled to this Final Evaluation of the subject any student that:
- or it was evaluated by Final Evaluation already in the ordinary call.
- or expressly requests it in writing before the June of the corresponding academic year.

It should be recalled that the Final Evaluation consists of 70 % of the written exam and 30 % of other tests.

MANDATORY MATERIALS

It is recommended that all the students have the following material: student guide, the norms of the subject, the program, the formulations of the problems and the guides for the experimental classes. It is compulsory that all the students go to the laboratory sessions with the stipulated Personal Protection Equipment: lab-coat, safety googles and globes.

BIBLIOGRAPHY

Basic bibliography

ACS, Química. Un proyecto de la ACS. Reverté, 2005.
Chang, R. Quimica. Mc Graw-Hill, 2013.
Peterson, W.R. Nomenclatura de las sustancias químicas. Reverté, 2013.
Reboiras, M.D. Química. La ciencia básica. Thomson, 2005.

Others (Laboratory):
Postman, J, Roberts, J.L., Hollenberg, J.L. Chemistry in the laboratory. Freeman and Company, 2004.
Martinez Urreaga et al. Experimentación en Química General. Thomson, 2006.
Dillon, S. Laboratory Manual. McMurry-Fay, 2008.

Detailed bibliography

Journals

Chemical Abstracts
Chemical Engineering Abstracts
AIChE Journal. AIChE, New York
Chemical Engineering & Technology. Wiley-VCH, Weinheim
Química e Industria. Asociación Nacional de Químicos de España, Madrid

Web sites of interest

http://www.acs.org
http://www.aiche.org
http://www.elsevier.com
http://www.accessscience.com
http://www.dekker.com
http://sciencedirect.com

OBSERVATIONS