UAB
Universitat Autònoma de Barcelona

Basic Chemistry II

Code: 105033
ECTS Credits: 8

2024/2025

Degree	Type	Year
2502444 Chemistry	FB	1

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official prerequisites. However, at the time of beginning the subject, students must know the fundamental concepts corresponding to the Baccalaureate Chemistry subjects: formulation, stoichiometry, thermodynamics and ionic equilibria (acid-base, precipitation and redox).

For those students who consider that their level of knowledge in these contents is not appropriate, a propaedeutic course is offered (information: faculty of sciences).

Objectives and Contextualisation

The subject's objective is double. The first objective of this introductory course is to standardize the level of the students, in all the knowledge that is part of the chemistry subjects of pre-university studies.

Based on this knowledge, the second objective is to provide the students with the necessary tools for a correct understanding of the subjects of subsequent courses. In particular, and among other knowledge, the subject should provide the student with the capacity to:

- calculate the thermodynamic state functions and the understanding of their relationship with chemical reactions and chemical equilibrium;

- perform calculations in acid-base ionic equilibria, precipitation and complexation;

- understand spontaneous and non-spontaneous electrochemical processes.

Competences

- Adapt to new situations.
- Apply knowledge of chemistry to problem solving of a quantitative or qualitative nature in familiar and professional fields.
- Be ethically committed.
- Communicate orally and in writing in one's own language.
- Have numerical calculation skills.
- Learn autonomously.
- Manage the organisation and planning of tasks.
- Manage, analyse and synthesise information.
- Obtain information, including by digital means.
- Propose creative ideas and solutions.
- Reason in a critical manner
- Resolve problems and make decisions.
- Show an understanding of the basic concepts, principles, theories and facts of the different areas of chemistry.
- Show initiative and an enterprising spirit.
- Show motivation for quality.

Learning Outcomes

1. Adapt to new situations.
2. Be ethically committed.
3. Calculate changes in thermodynamic functions for a process and relate them with the corresponding thermodynamic variables.
4. Calculate the cell potentials for redox reactions and predict spontaneity from these potentials.
5. Communicate orally and in writing in one's own language.
6. Describe the complex ion concept its formulation and nomenclature.
7. Describe the concept of chemical equilibrium and the factors that can modify it.
8. Describe the concept of solubility and the variables that affect it.
9. Describe the concepts of electrochemical cells, galvanic batteries and electrolytic cells.
10. Describe the three principles of thermodynamics and the associated thermodynamic functions.
11. Determine concentrations of acid and bases from acid-base estimations.
12. Determine the velocity equation of an elementary process.
13. Have numerical calculation skills.
14. Identify the acid or Brønsted-base nature of chemical compounds in solution.
15. Identify the kinetic parameters of a chemical reaction, relate these to the reaction mechanism, and describe its dependence on temperature.
16. Identify the principal functional organic groups and describe their most important physical and chemical properties.
17. Identify the processes of reduction and oxidation in a redox reaction and equalise the corresponding chemical equation.
18. Learn autonomously.
19. Manage the organisation and planning of tasks.
20. Manage, analyse and synthesise information.
21. Name and formulate the organic and inorganic chemical compounds.
22. Obtain information, including by digital means.
23. Perform calculations of complexation and solubility equilibriums.
24. Predict the basic physical and chemical properties of organic compounds on the basis of the functional groups that they present.
25. Properly calculate the pH of aqueous dissolutions of acids, bases, as well as of mixtures of acids, bases and acids and bases.

26. Properly predict the spontaneity of a reaction from the functions of thermodynamic state.
27. Propose creative ideas and solutions.
28. Reason in a critical manner
29. Resolve problems and make decisions.
30. Show initiative and an enterprising spirit.
31. Show motivation for quality.
32. Work properly with chemical equations and the main magnitudes of matter.
33. Work properly with equilibrium constants and predict the effect of disturbance on chemical processes in equilibrium.

Content

BLOCK I. Thermodynamics and kinetic

Unit 1. Principles of thermodynamics

Unit 2. Thermochemistry

Unit 3. Chemical equilibrium

Unit 4. Kinetic

BLOCK II. Homogeneous and heterogeneous equilibrium

Unit 5. Homogeneous equilibrium in solution

Unit 6. Heterogeneous equilibrium

Unit 7. Electrochemistry

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem classes	20	0.8	1, 21, 18, 3, 25, 4, 5, 30, 31, 11, 12, 19, 20, 14, 16, 17, 2, 22, 26, 24, 27, 28, 23, 29, 13, 33, 32
Theory classes	48	1.92	3, 25, 4, 31, 7, 6, 8, 9, 10, 11, 12, 14, 15, 17, 2, 22, 26, 27, 28, 23, 33
Type: Autonomous			
Study and completion of exercises	126	5.04	1, 21, 18, 3, 25, 4, 30, 31, 7, 6, 8, 9, 10, 11, 12, 19, 20, 14, 15, 16, 17, 2, 22, 26, 24, 27, 28, 23, 13, 33, 32

The course consists of two types of supervised activities, theoretical classes and problem classes, which are distributed throughout the course in an approximate ratio of 3 to 1.

Theoretical classes

Through the exhibitions of the teacher the student must acquire the own knowledge of this subject and complement them with the study of each subject treated with the help of the material that the teachers can provide to the student through of the Virtual Campus and the recommended bibliography. The theoretical classes will be open to the participation of the students, who will be able to raise to the professor the questions and clarifications that consider necessary.

Problem classes

The objective of this supervised activity is to solve problems and questions that have previously been raised to students through the Virtual Campus and that have had to be resolved previously, in a group or individually. Due to the smaller number of students in this type of classes, it is intended to stimulate the participation of students in the discussion of the alternatives to solve the problems, taking advantage of it to consolidate the knowledge acquired in the theory classes and in the study staff

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Block I exam	42,5%	2	0.08	1, 21, 18, 3, 30, 31, 10, 12, 19, 15, 16, 2, 22, 26, 24, 27, 28, 29, 33, 32
Block II exam	42,5%	2	0.08	1, 21, 25, 4, 30, 31, 6, 8, 9, 11, 19, 20, 14, 16, 17, 2, 22, 27, 28, 23, 29, 32
Learning evidences	15%	2	0.08	21, 3, 25, 4, 7, 6, 8, 9, 10, 11, 14, 17, 26, 24, 29, 33, 32
Recovery exam	85%	0	0	1, 21, 3, 25, 4, 5, 31, 7, 6, 8, 9, 10, 11, 19, 20, 14, 15, 16, 17, 26, 24, 27, 28, 23, 29, 13, 33, 32

CONTINUOUS EVALUATION

The final grade of the subject is obtained from the notes of the exams and the continuous work of the student (evidence of learning).

Weighted average of the exams of the subject = 0.50 x exam grade block I + 0.50 x exam grade block II

Final grade of course = 0.85 x weighted average grade of the exams of the subject + 0.15 x grade continuous work

To pass the subject, the following two conditions must be met:

1) The final grade of the subject must be ≥ 5.0

2) The exam grade of each block must be ≥ 4.0

Continued work

1) Four evidences will be collected; two evidences for block I and two evidences for block II. The evidence may be: problems solved individually or in groups in class, short tests in class, tests type test in class, self-evaluations in the virtual campus, ...

2) The failure to appear for evidence implies a zero in that evidence.

3) The grade of the continuous work will be the average of the three best grades of the four evidences.

Exams:

1) An exam will be held at the end of each block (block I exam and block II exam).

2) At the end of the semester, recovery exams of the two blocks (second option exams) will be offered.

Exams of recovery or improvement of grade (exams of second option):

- To participate in the recovery, students must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject.

- There is the possibility that students who do not need it take second option exams to improve the grade of the course

- For students who take these second option exams (recovery), the exam grade of the block will be the one they obtain in this second option exam.

- For students who take these second option exams (grade improvement), the exam grade of the block will be:

  - equal to that of the second option exam, if the second option exam grade > course exam not
  - equal to the average of the block exam and the second option exam, if the second option exam grade < course exam grade

UNIQUE EVALUATION

Within the regulatory period established by the University, students may request the single evaluation, renouncing the continuous evaluation.

The single assessment shall consist of two synthesis exams:

Synthesis exam of block I. It will have a weight of 50% in the final grade. You must obtain a minimum of 4.0 points (out of 10) to pass the subject.

Synthesis exam of block II. It will have a weight of 50% in the final grade. You must obtain a minimum of 4.0 points (out of 10) to pass the subject.

To pass the subject, a minimum final grade of 5.0 points (out of 10) must be obtained by taking the average of the two synthesis tests.

In the case of failing, students may take the recovery exam for the entire course (block I + block II).

- This recovery exam will also consist of two exams: block I and block II with a weight of 50% each.

- The same requirements will be requested to pass: minimum of 4.0 in each exam and 5.0 in the final grade of the course.

These synthesis and recovery exams will coincide with the dates of the 2nd partial and recovery exams of the students who opt for continuous evaluation.

GENERAL COMMENTS

- Qualification of "Not evaluable". The subject will be graded with a "Not evaluable" when the student has not participated in any of the evaluation activities of one of the blocks in which the subject is divided (exams and continuous work).

- The grades of the approved students may be increased in the final record up to 1.0 points in order to achieve the distribution between passed, notable, excellent and MHs that the teachers consider suitable

- Students who do not pass the subject so that the grade of one of the two blocks is < 4.0, regardless of whether the final grade is greater than or equal to 5.0, will obtain a maximum final grade of 4.5 considering the subject suspended.

- To attend any exam it is essential to carry an identification document (DNI or university card), with a recent and good quality photograph.

- Using unauthorized methods during one of the exams of the subject (copying or communicating with a classmate, use of mobile phones, use of smart watches, etc ...) will be penalized with a grade of "fail" in the overall of the subject of the current course.

Bibliography

Textbook:

- QUIMICA GENERAL: PRINCIPIOS Y APLICACIONES MODERNAS, R. H. Petrucci, F. G. Herring, J.D. Madura i C. Bissonnette , Pearson Educación SA, 10ª edició, Madrid 2011 (ISBN: 978-84-8322-680-3).

Link (11 ed.):
http://www.ingebook.com.are.uab.cat/ib/NPcd/IB_Escritorio_Visualizar?cod_primaria=1000193&libro=6751

Other support books:

- PRINCIPIOS DE QUÍMICA, P. Atkins i L. Jones, Médica Panamericana, 3ª edició, 2006.

- QUÍMICA, R. Chang, McGraw-Hill, 9ª edició, 2010.

- Physical Chemistry for the Biosciences, Chang, R. University Science Books, 2005. (Edició traduïda: Fisicoquímica para las ciències químicas y biológicas, 3a edición, MacGraw-Hill, 2008).

- Principios de Físico-química, Ira N. Levine, McGraw-Hill 6ª edició, 2014.

Software

There is not.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	2	Spanish	second semester	morning-mixed

(PAUL) Classroom practices	3	Catalan	second semester	afternoon
(PAUL) Classroom practices	4	Catalan	second semester	afternoon
(TE) Theory	1	Catalan	second semester	morning-mixed
(TE) Theory	2	Catalan	second semester	morning-mixed