



Information about the subject

Degree: Bachelor of Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 271110 **Name:** Chemistry of Aqueous Solutions

Credits: 6,00 **ECTS Year:** 1 **Semester:** 2

Module: Fundamental Science

Subject Matter: Chemistry **Type:** Basic Formation

Field of knowledge: Sciences

Department: Basic and Cross-disciplinary Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

Fundamental Science

| Subject Matter | ECTS | Subject | ECTS | Year/semester |
|----------------|-------|--------------------------------|------|---------------|
| Physics | 12,00 | Fluid Mechanics | 6,00 | 1/2 |
| | | Physics | 6,00 | 1/1 |
| Mathematics | 6,00 | Mathematics | 6,00 | 1/1 |
| Chemistry | 12,00 | Chemistry | 6,00 | 1/1 |
| | | Chemistry of Aqueous Solutions | 6,00 | 1/2 |
| Biology | 12,00 | Biochemistry | 6,00 | 1/2 |
| | | Biology | 6,00 | 1/1 |
| Geology | 6,00 | Geology | 6,00 | 1/2 |

Recommended knowledge

General Chemistry
General Physics



Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 The student is able to understand and assimilate the concepts included in the syllabus of the subject.
- R2 The student is able to solve problems related to the contents of the subject by using different resources.
- R3 The student is able to work in a chemistry laboratory performing basic operations correctly and observing the relevant safety regulations.
- R4 The student is able to understand correctly the planning of a practical laboratory experience, as well as its development, purpose and interpretation of the results.
- R5 The student uses language appropriately, both in general writing and in the presentation of data.
- R6 The student collaborates with his/her teacher and classmates during the learning process.



Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

| BASIC | | Weighting | | | |
|-------|---|-----------|---|---|---|
| | | 1 | 2 | 3 | 4 |
| CB1 | Students acquire and understand knowledge in their field of study based on general secondary education but usually reaching a level that, although supported on advanced text books, also includes aspects involving state-of-the-art knowledge specific to their area. | | | X | |
| CB2 | Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study. | | | | X |
| CB5 | Students develop the necessary learning skills to undertake further studies with a high level of autonomy. | | | X | |

| GENERAL | | Weighting | | | |
|---------|--|-----------|---|---|---|
| | | 1 | 2 | 3 | 4 |
| CG1 | Capacity to analyze and synthesize | | | X | |
| CG2 | Capacity to organize and plan | | | X | |
| CG3 | Mastering Spanish oral and written communication | | | X | |
| CG5 | Knowing and applying Basic ITC skills related to marine science | | | X | |
| CG6 | Capacity to manage information (capacity to look for and analyze information coming from different types of sources) | | | X | |
| CG7 | Decision making | | | X | |
| CG8 | Capacity to work in interdisciplinary and multidisciplinary team | | | X | |
| CG9 | Interpersonal skills | | | X | |



| | | | | | |
|------|--|--|---|--|---|
| CG10 | Critical and self-critical capacity | | X | | |
| CG11 | Capacity to learn | | | | X |
| CG12 | Capacity to adapt to new situations | | X | | |
| CG13 | Capacity to produce new ideas (creativity) | | X | | |
| CG16 | Capacity to apply theoretical knowledge | | | | X |

SPECIFIC

Weighting

| | | 1 | 2 | 3 | 4 |
|------|---|---|---|---|---|
| CE8 | Identifying and analyzing new problems and proposing solution strategies | | | | X |
| CE9 | Knowing how to carry out experiments and measurements both in the laboratory and during sample collection | | | | X |
| CE11 | Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork | | | | X |



Assessment system for the acquisition of competencies and grading system

| Assessed learning outcomes | Granted percentage | Assessment method |
|----------------------------|--------------------|---|
| | 70,00% | Written test with theoretical and practical questions |
| | 10,00% | Delivery of guided assignments, whose objectives and contents will be proposed by the teacher |
| | 10,00% | Laboratory test |
| | 10,00% | Oral presentation |

Observations

According to the general evaluation and qualification regulations, the preferred evaluation system will be by means of continuous evaluation.

The written exam consists of theory and problems and takes place on the day and time stipulated in the official final exam schedule. A minimum mark of 4.0 out of 10 is required in order to obtain an average mark.

The work consists of handing in the laboratory worksheets as the practicals are carried out. The worksheets will be handed in by work groups.

Individual questionnaires will also be carried out through the virtual campus throughout the semester.

The practical laboratory test requires a minimum mark of 4.0 out of 10 in order to be averaged. Attendance to the practical laboratory test is compulsory. Only 1 absence from the laboratory is allowed, provided that it is justified.

The work exhibition is based on Calpe's project.



MENTION OF DISTINCTION:

In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- M1 Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
- M2 Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.
- M3 Activities carried out in spaces with specialized equipment.
- M6 Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.
- M8 Set of oral and/or written tests used in initial, formative or additive assessment of the student.
- M9 Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es)
- M10 Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es).



IN-CLASS LEARNING ACTIVITIES

| | LEARNING OUTCOMES | HOURS | ECTS |
|-------------------------|------------------------|--------------|-------------|
| ON-CAMPUS CLASS M1 | R1, R4, R5 | 40,00 | 1,60 |
| PRACTICAL CLASSES M2 | R1, R4, R5 | 5,00 | 0,20 |
| LABORATORY M3 | R1, R2, R3, R4, R5, R6 | 10,00 | 0,40 |
| TUTORIAL M6 | R1, R5 | 3,00 | 0,12 |
| ASSESSMENT M8 | R1, R2, R3, R4, R5 | 2,00 | 0,08 |
| TOTAL | | 60,00 | 2,40 |

LEARNING ACTIVITIES OF AUTONOMOUS WORK

| | LEARNING OUTCOMES | HOURS | ECTS |
|-------------------------|--------------------|--------------|-------------|
| GROUP WORK M9 | R1, R2, R3, R4, R5 | 20,00 | 0,80 |
| INDEPENDENT WORK M10 | R1, R3, R4 | 70,00 | 2,80 |
| TOTAL | | 90,00 | 3,60 |



Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

| Content block | Contents |
|----------------------------------|--|
| THERMODYNAMICS | Thermochemistry Conditions of spontaneity and balance |
| LIQUIDS AND DISSOLUTIONS | Solutions Colligative properties |
| BALANCING PHASES. REAL SOLUTIONS | Balancing phases in single-component systems and binary systems Chemical balance Real solutions |
| KINETICS | Chemical reaction rate Complex reactions Molecular kinetics Catalysis and photochemistry |
| LABORATORY | Measurement of the enthalpy of dissolution of benzoic acid. Colligative properties. Solute concentration effect Kinetic study of the hydrolysis of an ester Kinetic study of the discoloration of phenolphthalein by spectrophotometry. Catalysis. |



Organization of the practical activities:

| | Content | Place | Hours |
|------|--|----------------|-------|
| PR1. | Seminar foundation and calculations of the practices: Measurement of the enthalpy of dissolution of benzoic acid and Kinetic study of the discoloration of phenolphthalein by spectrophotometry. | Lecture room | 2,00 |
| PR2. | Measurement of the enthalpy of dissolution of benzoic acid. | Laboratory | 2,00 |
| PR3. | Kinetic study of the discoloration of phenolphthalein by spectrophotometry. | Laboratory | 2,00 |
| PR4. | Seminar foundation and calculations of the practices: Catalysis and kinetic study of the hydrolysis of an ester. Colligative properties. Solute concentration effect. | Lecture room | 2,00 |
| PR5. | Catalysis | Laboratory | 2,00 |
| PR6. | Kinetic study of the hydrolysis of an ester. Colligative properties. | Laboratory | 2,00 |
| PR7. | Taking samples to determine physical-chemical parameters | Marine station | 1,00 |
| PR8. | Determination of physicochemical parameters in marine samples | Laboratory | 2,00 |



Temporary organization of learning:

| Block of content | Number of sessions | Hours |
|----------------------------------|--------------------|-------|
| THERMODYNAMICS | 6,00 | 12,00 |
| LIQUIDS AND DISSOLUTIONS | 3,00 | 6,00 |
| BALANCING PHASES. REAL SOLUTIONS | 10,00 | 20,00 |
| KINETICS | 6,00 | 12,00 |
| LABORATORY | 5,00 | 10,00 |

References

REFERENCES

Fisico-Química. Atkins P. W. Ed. Addison-Wesley Iberoamericana, 1986
Química Física. Díaz- Peña M., Roig Muntaner. Ed. Alambra, 1983
Manual de Termodinámica. Gandía V. Ed. Universitat de Valencia, 1995
Fisicoquímica para farmacia y biología. Sanz Pedrero, P. Ed. Masson-Salvat, 1992
Problemas de Fisicoquímica. Levine I. N., Ed. McGraw-Hill, 2005
Introducción a la Fisicoquímica. J.L. Moreno Frigols, R.García Doménech, G.Antón Fos. Universitat de València, 2011

COMPLEMENTARY REFERENCES

Química general. R.H. Petrucci, W.S. Harwood y F. G. Herring. Ed. Prentice Hall, 2003.
Química. R. Chang. Ed. Mc Graw-Hill, 1997.
Química principios y reacciones. W. I. Masterton y C.N. Hurley. Ed. Thomson. Paraninfo, 2003.
Fundamentos de fisicoquímica. S.H. Maron y C.F. Prutton. Ed. Limusa, 1998.
Química curso universitario. B.M. Mahan y R.J. Myers. Ed. Addison-Wesley Iberoamericana, 1990.
Química general. J.B. Umland y J.M. Bellana, Ed. Thomson, 1999.