



## INTRODUCTION

**Brief description:** Quantitative approach to solve real day to day problems by using classical analytical techniques.

- **Degree:** Chemistry
- **Module in the Degree Program:** Module II: Fundamentals of Chemistry; Analytical Chemistry
- **Year, Semester:** Second year, second semester
- **Type of course:** Compulsory
- **ECTS:** 6
- **Professor:** José María Fernández Álvarez
- **Language:** English
- **Classroom, Timetable:** Classroom 34. Tuesdays & Fridays: 16 h. Thursdays: 17 h. Seminars: every second week on Wednesdays at 18 h.

## COMPETENCIES

- **Specific skills:** CE 1, CE 2, CE 10. Analyze and solve qualitative and quantitative problems according to previously developed models and recognize new problems and plan strategies for their resolution. Processing, compute, evaluate, interpret and synthesize data and chemical information. Understand the types of chemical reactions. Understanding the application of the reactions to the procedures used in chemical analysis to identify, characterize and determine the chemical compounds.
- **General & Basic skills:** CG 6, CB II. That students can apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study. Properly use the method of induction. Being able to generalize the knowledge gained once other similar cases or cases that may arise in the future.

## LECTURE SCHEDULE

- **LESSON 1.** - [Introduction to Analytical Chemistry](#)
- **LESSON 2.** - [Fundamentals of gravimetric analysis](#)
- **LESSON 3.** - [Fundamentals of volumetric analysis](#)
- **LESSON 4.** - [Argentometric titrations](#)
- **LESSON 5.** - [Acid-base titrations](#)
- **LESSON 6.** - [Complex formation titrations](#)
- **LESSON 7.** - [Oxidation-reduction titrations](#)
- **LESSON 8.** - [Potentiometry: Redox electrodes and selective-ions electrodes](#)



• **LESSON 9.** - [Instrumental indications in titrations](#)

Links will take you to Prezi presentations used in the course. They are provided just as complimentary material in case they might prove useful for recap the topics addressed in the course. Obviously, they do not substitute the attendance either to classroom lectures or streaming sessions where topics are fully explained and discussed.

## EDUCATIONAL ACTIVITIES

1. **Lectures:** will take place on Tuesdays (16.00 h.), Thursdays (17.00 h.) & Fridays (16.00 h.) in Classroom 34.
2. **Seminars:** will take place every second Wednesday at 18.00 h, in the same Classroom 34, in which every student will be required to solve at least one practical professional case along the course. This is a pilot activity within the Transformative Learning Project (TLP) in which Class discussions will deal with real-world problems.
3. **One-to-one tutorials:** Every student may have personal interviews with the professor to help with personal study and learning.

**Credits/hours distribution of the activities. 6 ECTS = 150 h (25 h/ECTS)**

Activity	ECTS	Allocated time (h)	Percentage (%)
Lectures	1.52	38	25.3
Seminars	0.28	7	4.7
Evaluation	0.24	6	4.0
<b>Total Classroom Activities</b>	<b>2.04</b>	<b>51</b>	<b>34.0</b>
One to one tutorials	0.04	1	0.7
Professional cases (TLP)	0.40	10	6.6



Personal study	3.52	88	58.7
<b>TOTAL</b>	<b>6</b>	<b>150</b>	<b>100.0</b>

## EVALUATION

### ORDINARY CALL

- 1 short test on theory: 13%
- 1 short test on practical cases: 13%
- 1 Professional problem: 4%
- Final exam: 70%

The final exam will consist of a test of theory fundamentals and a practical case.

The final exam is the weighted average on both sides (60% theory and 40% of problems).

In order to pass the final exam (in either the ordinary or the extraordinary call) a minimum mark of 4 points should be attained in the theory and a minimum mark of 3 points should be reached in the problems. Should the student fail to reach simultaneously those two mandatory requirements, the global mark of the course would be FAIL, irrespective of the averaged mark calculated using the course activities, and a maximum value of 4 will appear in the official record.

### EXTRAORDINARY CALL

In the extraordinary call, the same criteria will apply, in which the results obtained during the course will only be taken into account if they result in an improvement of the final mark.

## OFFICE HOURS

Dr. Fernández ([jmfdez@unav.es](mailto:jmfdez@unav.es))

- Office 0-030. Research Building. Ground floor
- Time: Tuesdays through Thursdays, 10 to 11 h.

## BIBLIOGRAPHY & RESOURCES



## Universidad de Navarra

- "Skoog and West's Fundamentals of Analytical Chemistry"  
(9th edition), F.J. Holler, S.R. Crouch, Cengage Learning, 2013.  
International edition. ISBN: 1-285-05624-8 [Localízalo en la Biblioteca](#)
- [QUANCHEM - Quantitative Analytical Chemistry \(Manual\)](#), J.M. Fernández. Dadun 2014. [Localízalo en la Biblioteca](#)
- [Química Analítica Cuantitativa \(Manual\)](#), J.M. Fernández. 2013.  
[Localízalo en la Biblioteca](#)
- "A collection of Analytical Chemistry solved and explained exercises", JM Fernández, I. Navarro, JI Álvarez. EUNSA, Colección Apuntes. Pamplona, agosto 2020. ISBN: 978-84-313-3483-3  
[Localízalo en la Biblioteca](#) [recurso electrónico]
- Manual de Ejercicios Resueltos de Química Analítica Cuantitativa, J. M. Fernández. 2ª edición, corregida, revisada y ampliada. 2020. ISBN: 978-84-09-19606-7. [Localízalo en la Biblioteca](#)
- "Problemas resueltos de Química Analítica", P.Yáñez-Sedeño, J.M. Pingarrón, F.J.M. de Villena, Síntesis, 2003. [Localízalo en la Biblioteca](#)
- Autoevaluación en Química Analítica Cuantitativa, J.M. Fernández. 2013. [Localízalo en la Biblioteca](#)