

Instrumental Methods of Analysis B

Calendar: 5th semester

Contact Hours: 30h00 T + 22h50 PL + 7h50 OT

Scientific Area: Química

Learning outcomes of the curricular unit

Interpret the results of chemical analysis using statistic methods.
Understand and apply the theoretical concepts of analytical chemistry.
Understand and use the quality control in the results of analytical measurements.
Acquire knowledge about the instrumentation of the various analytical methods.
Understand the physicochemical principle of the several analytical methods.
Understand the advantages and disadvantages of each method.
Identify qualitative and quantitative capacities of the methods.
Apply the various calibration methods.
Plan and prepare laboratory experiments.
Acquire critical capacity and analytical integration of knowledge in laboratory work

Syllabus

1. Qualitative and Quantitative analyses.
2. Optical Methods (atomic and molecular absorption – UV/VIS; flame photometry; atomic absorption, FTIR, ICP; Fluorescence, Phosphorescence).
3. Mass Spectroscopy.
4. Electroanalytical Methods (Potentiometric methods, Voltammetric, Coulometric and Electrogravimetric methods).
5. RX Diffraction.
6. RMN.
7. Chromatographic Methods (HPLC, GC, SEC, etc.).

Demonstration of the syllabus coherence with the curricular unit's objectives

The main objectives of the present UC consist in the acquisition of skills by the students, namely laboratory techniques and common analysis methods. Students should acquire knowledge about the techniques and methods, their respective limitations, potential applications, and choose the most appropriate methods and techniques for each situation. In order to accomplish this, the structure of the course is divided by chapters, each one devoted to a class of methods or techniques.

Teaching methodologies:

Lectures resorts to technical expository of the syllabus stimulating reasoning and critical thinking of students. In practical classes students solve the exercises independently under the teacher's supervision.

Demonstration of the coherence between the teaching methodologies and the learning outcomes.

The objectives consist in the acquisition of skills by the students concerning laboratory techniques and more common analysis methods. In this context students should acquire knowledge of the techniques and methods, know/understand their limitations, and potential applications, and choose the most appropriate methods and techniques for each situation. These basic contents to be seized with rigor by the students should be taught in a solid and consistent manner, with the basic concepts and mathematical developments conveniently explained. Therefore it is necessary that these contents are taught in theoretical lectures.

In order to get consolidation of the theoretical concepts it is necessary that an appreciable number of exercises and applied problems are solved by students under the teacher's supervision. This is the reason why a significant number of practical classes is required. Finally, students can also consolidate the knowledge by conducting laboratory experiments, analysis of results and presentation of the respective reports. This learning part takes place within the integrated laboratory course of the same semester (lab V).