

## COURSE SYLLABUS

### 1. Identification

Code and title: QUP 113 – Special Topics in Atomic Absorption Spectrometry

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Level: Master and Doctorate

Credit hours: 2

Revised: August\_2021

### 2. Summary

Theoretical fundamentals and instrumentation. Atomic Absorption Spectrometry with flame, graphite furnace and chemical vapor generation. High Resolution Continuous Source Atomic Absorption Spectrometry. Steps of an analytical method.

### 3. Objective

The main objective of this course is to present the fundamentals and applications of atomic absorption spectrometry techniques for the determination of elements in materials of environmental, industrial, agronomic, geological and clinical interest, etc. The latest innovations of spectrometric techniques, as well as the future trends will also be exposed.

### 4. Contents

- History of spectroscopy
- Fundamentals / Instrumentation
- Atomic absorption spectrometry techniques (AAS)
- Flame technique: structure and chemical composition of flames; Flame atomization routes; Non-spectral interferences.
- The graphite furnace technique: longitudinal and transversal heating atomizers, with and without platform; Atomization mechanisms in graphite furnace. Chemical modifiers; Spectral interferences.
- The technique of chemical vapor generation: mechanisms of generation and release of volatile compounds; Interferences involved in generation, release and atomization steps; Hydrides pre-concentration techniques.
- Steps of an analytical method.
- High resolution continuous source atomic absorption spectrometry: general principles, instrumentation, capability and applications.

### 5. Assessment

Theoretical exams and seminars. The student, who obtains a final grade of A, B or C, awarded as per the list below, will be considered approved:

A: grade equal to or above 9.0

B: grade equal to or above 7.5 and below 9.0

C: grade equal to or above 5.0 and below 7.5

D: grade below 5

FF: lack of frequency

## 6. Methodology

Lectures, exercises lists, seminars and examinations.

## 7. Bibliography

- B. Welz and M. Sperling, Atomic absorption spectrometry, 3rd ed., Weinheim, Wiley-VCH, 1999.
- B. Welz, H. Becker-Ross, S. Florek and U. Heitmann, High-Resolution Continuum Source AAS: The better way to do atomic absorption spectrometry. Weinheim, Wiley-VCH, 2004.
- Encyclopedia of Applied Spectroscopy, Andrews, D. L., Wiley-VCH, Verlag GmbH & Co. KGaA, 2009.
- Analytical Instrumentation Handbook. 3 ed. New York: Marcel Dekker, 2005.
- F. J. Krug, J. A. Nóbrega and P. V. Oliveira, Espectrometria de Absorção Atômica. CENA-USP, Piracicaba, 2001, 40p (apostila).
- J. Dědina and D. L. Tsalev, Hydride Generation Atomic Absorption Spectrometry; John Wiley & Sons, Inc.: Chichester, 1995.