



# **COURSE OUTLINE**

# 1. COURSE INFORMATION

SCHOOL	Mineral Resources Engineering				
DEPARTMENT	Mineral Resources Engineering				
COURSE LEVEL	Post-Graduate				
COURSE ID	ST021	SEMESTER Spring			
COURSE TITLE	Instrumental Analysis for Raw Materials				
COURSE MODULES					
in the case of credits being awarded in distinct parts of the course eg. Lectures, Laboratory Exercises, etc. If credit units are awarded uniformly for the whole course, indicate the weekly hours of teaching and the total number of credits.			INSTRUCTION HOURS PER WEEK		CREDITS
		3			
Laboratories			0		
Tutorial Exercises			0		
Total			3		10
Add rows if needed. The teaching organization and teaching					
methods used are described in detail in (4).					
COURSE TYPE	General bac	kground			
Background, General Knowledge,					
Scientific Area, Skills Development					
PREREQUISITES:	-				
INSTRUCTION/EXAM LANGUAGE:	English				
THE COURSE IS OFFERED TO	Yes				
ERASMUS STUDENTS:					
COURSE URL:	EURECA-PRO LMS Moodle URL:				
	https://moodle.eurecapro.tuc.gr/course/view.php?id=75				

## 2. LEARNING OUTCOMES

#### Learning Outcomes

The learning outcomes of the course describe the specific knowledge, skills and competences of an appropriate level that students will acquire after successfully completing the course.

After completing this course the student will be able to:

- Compare (Evaluate) various analytical methods.
- Recognize the advantages and disadvantages of various analytical techniques.
- Explain the difficulties arising during instrumental chemical analysis.
- Select to choose the most appropriate technique, depending on the problem he has to solve.
- Interpret the basic mode of operation of specific analytical techniques

# **General Competencies/Skills**

Considering the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and below), which one(s) the course enhances?

Search, analysis and synthesis of data and information, using the necessary technologies. Adaptation to new situations Decision making Autonomous work Production of new research ideas All of the above Exercise criticism and self-criticism Promoting free, creative and inductive thinking







# 3. COURSE SYLLABUS

- 1) Interaction of radiation with matter, spectral line broadening
- 2) X-Ray Analysis and modern applications
- 3) Analytical applications of synchrotron radiation
- 4) Gamma ray spectrometry,
- 5) Activation analysis,
- 6) Mössbauer spectroscopy,
- 7) Microbeam and surface analysis
- 8) Environmental radioactivity, the table of isotopes, The radon problem,
- 9) Membranes in analytical chemistry, Speciation analysis,
- 10-12) Special applications of selected analytical methods

13) Presentations

## 4. TEACHING and LEARNING METHODS – ASSESSMENT

<b>LECTURE METHOD</b> Face to face, distance learning, etc.	Face to face				
USE OF INFORMATION AND	Viewing slides using a PC				
COMMUNICATION TECHNOLOGY					
Use of ICT in Teaching, in Laboratory Exercises,					
		Workload per semester (in			
	ΑCTIVITY	Hours)			
Describe in detail the way and methods of		,			
teaching. Lectures Seminars Laboratory Evercise Field	Lectures	39			
Exercise, Literature review & analysis, Tutoring,	Tutorials				
Practice (Placement), Clinical Exercise, Artistic	Lab assignments				
Lab, Interactive teaching, Educational visits, Project work project etc	Projects	71			
	Autonomous study	140			
The student's study hours for each learning activity and the hours of non-auided study					
according to the ECTS principles are mentioned.	Course Total				
	Course Total	350			
	credit)	230			
ASSESSMENT METHODS	Assessment Language: Englis	h, Assessment Method: Public			
Description of the evaluation process	Presentation and Multiple Choice Test				
Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test,					
Short Answer Questions, Essay Development Questions Problem Solving Written					
Assignment, Essay / Report, Oral Exam, Public					
Presentation, Laboratory Assignment, Clinical					
Examination of Patients, Artistic Interpretation,					
Well defined student assessment criteria are					
mentionea. Mention whether and how the students can access them.					

# 5. DIGITIZATION (use of tools & software)





#### **RECOMMENDED INTERNATIONAL LITERATURE** 6.

#### Books:

- Analytical Chemistry by Robert Kellner (Editor), Matthias Otto (Editor), H. Michael Widmer • (Editor), Jean-Michel Mermet (Editor) Wiley-VCH
- Measurement Statistic and Computation (John Wiley and Sons)
- Handbook of Practical X-Ray Fluorescence Analysis (Springer) •
- Handbook of X-Ray Spectrometry (Marcel Dekker, Inc.) •
- Radiation Protection of the Public and the Environment, International Atomic Energy Agency, • Vienna 2018

Journals:

- Chemical Review (American Chemical Society) •
- Analytical Chemistry (American Chemical Society) Special issues •
- Analyst (The Royal Society of Chemistry) Tutorial reviews •
- X-Ray Spectrometry (Wiley)

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