



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
<b>ACADEMIC YEAR</b>	2017/2018		
<b>BACHELOR'S DEGREE (BSC)</b>	BIOLOGICAL SCIENCES		
<b>INTEGRATED COURSE</b>	CHEMICAL-PHYSICAL METHODS FOR BIOLOGICAL APPLICATIONS		
<b>CODE</b>	18657		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	CHIM/02		
<b>HEAD PROFESSOR(S)</b>	CHILLURA MARTINO DELIA FRANCESCA	Professore Ordinario	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	CHILLURA MARTINO DELIA FRANCESCA LOMBARDO RENATO	Professore Ordinario Ricercatore	Univ. di PALERMO Univ. di PALERMO
<b>CREDITS</b>	6		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	2		
<b>TERM (SEMESTER)</b>	2° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>CHILLURA MARTINO DELIA FRANCESCA</b> Monday 15:00 16:00 Studio Prof. Chillura. Ed. 17 - Viale delle Scienze</p> <p><b>LOMBARDO RENATO</b> Tuesday 10:00 12:00 Dipartimento STEBICEF Studio 1/B4, edificio 17, viale delle Scienze</p> <p>Thursday 10:00 12:00 Dipartimento STEBICEF Studio 1/B4, edificio 17, viale delle Scienze</p>		

**DOCENTE:** Prof.ssa DELIA FRANCESCA CHILLURA MARTINO

<b>PREREQUISITES</b>	Bases of physics: electromagnetic radiation, wave behavior of electromagnetic radiation, radiation-matter interaction. Bases of mathematics: first-degree equations, concept of integral and derivative.
<b>LEARNING OUTCOMES</b>	Knowledge and understanding of the physical principles that regulate the interaction-matter radiation phenomena underlying the functioning of the characterization techniques applied to the study of issues of interest in Biological Sciences. Ability to understand the scientific language relating to physical chemical techniques. Knowledge and ability to use the concept of error in measurement, error propagation, and statistical data processing. Students must develop skills related to the use of analytical methods and must be able to identify the problem to be studied and select the appropriate techniques for obtaining relevant and valid results. Evaluate autonomously the application difficulties and the advantages resulting from the use of investigated techniques. Demonstrate having the ability to integrate knowledge and manage complexity, and make judgments on the basis of limited and incomplete information, integrating them by using scientific literature and designing additional experimental investigations. Students must be able to: - Expose the basic concepts of physical principles governing analytical techniques; To expose the basic concepts of error theory; - to be able to communicate clearly and without ambiguity, even to non-expert interviewees, their conclusions and knowledge; - to deepen the subject matter through specific scientific articles of matter in an autonomous and individual way.
<b>ASSESSMENT METHODS</b>	Learning level is evaluated by an individual interview. During the oral interview, the student will have to answer at least three questions concerning the topics listed in the program, demonstrating that they have adequate knowledge and interpretative competence of the general and specific content, a capacity for linking and processing the contents, as well as, a pertinent ability to form cogent argumentation. The evaluation is expressed as 30/30 and is considered inadequate if the student has difficulty to focus the proposed arguments, lack of knowledge and extreme limitation in exposure. The threshold of sufficiency (18/30) is achieved if the student's abilities allow the examiner to ascertain knowledge and understanding of the topics at least in their general lines. Increasing the degree of detail of the knowledge shown by the student, the positivity of the assessment increases proportionally. The maximum score is obtained in case of excellent critical-interpretative competence of the contents of the course, associated with the ability to use of appropriate scientific terminology.
<b>TEACHING METHODS</b>	The course is organized in frontal lessons. Classroom demonstration of simple applications is foreseen.

## MODULE PRINCIPLES OF SPECTROSCOPY

*Prof. RENATO LOMBARDO*

<b>SUGGESTED BIBLIOGRAPHY</b>	
Sheenan, D. Physical Biochemistry, 2nd ed., Wiley-Blackwell, Oxford, UK Cooper, A. Biophysical Chemistry, 2nd ed., RCS Publishing, London, UK	
<b>AMBIT</b>	10665-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	47
<b>COURSE ACTIVITY (Hrs)</b>	28
<b>EDUCATIONAL OBJECTIVES OF THE MODULE</b>	
Provide basic knowledge of spectroscopic techniques both from a theoretical and applied point of view with particular regard to the research techniques commonly used in the field of the life sciences	

## SYLLABUS

Hrs	Frontal teaching
2	Electromagnetic radiation and its interaction with matter
4	UV/Vis spectroscopy
2	Fluorescence spectroscopy
4	Infrared spectroscopy
4	NMR spectroscopy
Hrs	Practice
12	Exercise

**MODULE  
DATA ANALYSIS AND REPRESENTATION**

*Prof.ssa DELIA FRANCESCA CHILLURA MARTINO*

**SUGGESTED BIBLIOGRAPHY**

Introduzione all'analisi degli errori. Lo studio delle incertezze nelle misure fisiche. John R. Taylor e S. Caporaloni. II Ed - Zanichelli Ed.

<b>AMBIT</b>	10665-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	47
<b>COURSE ACTIVITY (Hrs)</b>	28

**EDUCATIONAL OBJECTIVES OF THE MODULE**

To provide the concepts of error and of error propagation. To provide knowledge about the methods of representation and regression of the experimental data.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
4	Uncertainty and experimental error. Relative uncertainty, significant figures. Uncertainty propagation
4	Statistical analysis of random uncertainties. The normal distribution.
4	Rejection of data. Weighted averages. Method of least squares.
4	Covariance and correlation. Distributions.
<b>Hrs</b>	<b>Practice</b>
12	Numerical exercises