



Asignatura: Técnicas experimentales  
Código: 31209  
Centro: Facultad de Ciencias  
Titulación: Máster en Biofísica  
Nivel: Máster  
Tipo: Obligatoria  
Nº de créditos: 8 ECTS

## ASIGNATURA / COURSE TITLE

Técnicas experimentales/ [Experimental techniques](#)

### 1.1. Código / [Course number](#)

31209

### 1.2. Materia / [Content area](#)

Física, Biología, Bioquímica / [Physics, Biology, Biochemistry](#)

### 1.3. Tipo / [Course type](#)

Obligatoria / [Compulsory](#)

### 1.4. Nivel / [Course level](#)

Posgrado / [Graduate \(postgraduate program\)](#)

### 1.5. Curso / [Year](#)

1º / [1st](#)

### 1.6. Semestre / [Semester](#)

1º y 2º / [1<sup>st</sup> and 2<sup>nd</sup>](#)

### 1.7. Número de créditos/ [Credit allotment](#)

8 ECTS / [8 ECTS](#)

### 1.8. Requisitos previos/ [Prerequisites](#)

There are no specific prerequisites.

### 1.9. Requisitos mínimos de asistencia a las sesiones presenciales / [Minimum attendance requirement](#)

Minimum attendance to practical sessions: 80%.



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## 1.10. Datos del equipo docente/ Faculty data

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## 1.11. Objetivos del curso/ Course objectives

This subject will introduce the students, using a series of specialized seminars imparted by researchers and practical lab demonstrations, to a wide variety of advanced experimental techniques used to quantitatively characterize biological systems. The physical grounds of each technique will be discussed, as well as state of the art applications in biology. For several techniques, the students will receive basic practical training either in computers rooms, such as in analysis of mass spectrometry data or infrared spectra, or in research labs under the supervision of specialized faculty.

### - Contenidos del programa/ Course contents

#### Advanced seminars:

1. Electronic microscopy and characterization of protein structure.
2. Near field microscopies (AFM).
3. Spectroscopic techniques applied to biomolecules.
4. Plasmon surface resonance.
5. Fluorescence microscopy.
6. Infrared spectroscopy.
7. Mass spectrometry.
8. Biosensors.
9. Biomaterials.
10. Biofunctionalization of surfaces.

#### Practical labs:

1. Infrared and ultraviolet spectroscopy.
2. Fluorescence spectroscopy.
3. Plasmon surface resonance.
4. Atomic force microscopy.



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## 1.12. Referencias de consulta / Course bibliography

### Recommended textbooks and reading

*Estructura de proteínas.* Gómez-Moreno Calera, Sancho Sanz. Ariel Ciencia. 2003.  
*Principles of Fluorescence Spectroscopy.* Joseph R. Lakowicz  
*BIOQUÍMICA,* Stryer (2003) Ed. Reverté. 5ª Ed. p 261

*PHYSICSL BIOCHEMISTRY,* K.E. Van Holde, W.C. Johnson, P.S. Ho (2006) Prentice Hall.

*BIOPHYSICS. An introduction.* R. Cotterill (2003) Wiley

*PHYSICAL CHEMISTRY Principles and Applications in Biological Sciences.* Tinoco et al (2002) Prentice Hall.

ATKINS, P.W., *Química Física* 8ª Ed. Panamericana 2008

LEVINE, I.N., *Fisicoquímica,* Ed. Mc Graw-Hill, Madrid, 2004

-*Spectroscopic Methods For Analysis Of Protein Secondary Structure.* J.T. Pelton and L.R. McLean. (2000) *Analytical Biochemistry,* 277, 167-176.

-*Quantitative studies of the structure of proteins in solution by Fourier-transform infrared spectroscopy.* Arrondo, J.L.R. et al (1993) *Prog. Biophys. Molec. Biol.* 59, 33.

-*Methods for the detection and analysis of protein-protein interactions.* T. Berggard, S. Linse, P. James. *Proteomics* (2007) 2833.

-*Isothermal Titration Calorimetry: Experimental Design, Data Analysis, and Probing Macromolecule/Ligand Binding and Kinetic Interactions.* M.W. Freyer, E.A. Lewis, *Methods in Cell Biology* Vol 84 (2008) p 79

-*Spectroscopic Methods For Analysis Of Protein Secondary Structure.* J.T. Pelton and L.R. McLean. (2000) *Analytical Biochemistry,* 277, 167-176.

## 2. Métodos docentes/ Teaching methodology

1. Theory lectures: Oral presentations by specialized researchers of the fundamentals and applications of different biophysical techniques. Audiovisual material will be available for the students in the Master web page, or in the personal web pages of lecturers.
2. Practical lectures: Supervised training in a research lab using experimental devices such as infrared and fluorescence spectrometers, atomic force and plasmon surface microscopes. Practical use of software for analysis and interpretation of infrared spectra in the computers room.



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### 3. Tiempo de trabajo del estudiante / Student workload

		Nº de horas	Percentage
Personal attendance	Theory classes	50	45%
	Practical classes	40	
No attendance	Preparation of practical labs reports, practical exercises and independent study time.	110	55%
<b>Total</b>		<b>200 h</b>	<b>100%</b>

### 4. Métodos de evaluación y porcentaje en la calificación final / Evaluation procedures and weight of components in the final grade

Practical labs reports addressing questions about the different experimental techniques posed by the teachers: 50 %.

Questions proposed by the researchers of the advanced seminars: 50 %.

In the extraordinary evaluation session failed reports may be delivered again (up to 50%) and/or an exam with short questions must be passed (up to 50%).

### 5. Cronograma\* / Course calendar

Semana aprox. Week	Contenido Contents	Horas presenciales Contact hours	Horas no presenciales Independent study time
1-10	Advanced seminars	50	40
11-14	Practical sessions	40	70

\*Este cronograma tiene carácter orientativo.