



Asignatura: Biofísica Celular
Código: 30124
Centro: Facultad de Ciencias
Titulación: Máster en Biofísica
Nivel: Máster
Tipo: Obligatoria
Nº de créditos: 6 ECTS

ASIGNATURA / COURSE TITLE

Biofísica Celular / Cellular Biophysics

1.1. Código / Course number

30124

1.2. Materia / Content area

Física, Biología / Physics, Biology

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 / 1st

1.7. Número de créditos/ Credit allotment

3 ECTS / 3 ECTS

1.8. Requisitos previos/ Prerequisites

The same ones required to be accepted in the master program, but it is highly recommended that students attend the leveling courses offered in the Biophysics Master, or credit equivalent knowledge from other postgraduate courses.

1.9. Requisitos mínimos de asistencia a las sesiones presenciales / Minimum attendance requirement

Minimum attendance for theory and practical lectures: 80%. Attendance to seminars is highly recommended but optional.



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1.10. Datos del equipo docente/ Faculty data

Marisela Vélez

(subject coordinator)

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1.11. Objetivos del curso/ Course objectives

a) To study some essential biological processes from a physics perspective: analyzing the properties and behavior of certain biological structures as self-assembled systems and relating their biological function to their physical properties.

b) To study energy production in living systems with the perspective of understanding the essential elements required to mimic in artificial systems hydrogen production and solar energy conversion.

c) To integrate the physical concepts acquired in the subjects Molecular Interactions and Experimental Techniques and illustrate their relevance in the study of biological processes.

- Contenidos del programa/ Course contents

Biological Membranes I.

- Structure
- Physical properties
 - Lateral Diffusion
 - Phase segregation
 - Permeability

Biological Membranes II:

- Model Systems
 - Langmuir films
 - Liposomes
 - Supported membranes
- Biomimetic systems



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Bioenergetics

- Energy production by biological systems
- Chemiosmotic theory and electron transport chains
- Oxidative phosphorylation
- Photosynthesis
- Biomimetic systems for energy production

Advanced seminars

- Molecular Biophysics of nano-machines
- Protein engineering

1.12. Referencias de consulta / Course bibliography

Recommended textbooks:

Bioenergetics3. David Nicholls and Stuart J Ferguson Academic Press 2001

Biological Thermodynamics. Donald T. Haynie Cambridge University Press 2001

Physical Biology of the Cell. Rob Phillips, Jane Kondev, Julie Theriot, Garland Science 2009

Selected readings

2. Métodos docentes/ Teaching methodology

1. Theory lectures: Oral presentations by the teachers of the fundamental contents of the subject. Audiovisual material will be available for the students in the Master web page, or in the personal web pages of lecturers.
2. Practical lectures: Problems solution, practical exercises to be programmed by the students in the computers room assisted by teachers.
3. Group discussions: Discussion of research papers proposed by the teachers.
4. Advanced seminars: Monographic sessions by invited researchers on some specific aspect related to the subject, with emphasis on the current state of the art.

3. Tiempo de trabajo del estudiante / Student workload

		Nº de horas	Porcentaje
Personal attendance	Theory classes	16	40%
	Practical classes	4	
	Group discussion	5	
	Seminars	5	
No attendance	Preparation of practical exercises and papers discussions.	45	60%
Total		75 h	100%



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

Presentations (40%) Practical exercises(30%) Examination (30%).

The extraordinary evaluation will allow the students to pass the practical exercises (50%) and/or the exams (50%).

5. Cronograma* / Course calendar

Semana aprox. Week	Contenido Contents	Horas presenciales Contact hours	Horas no presenciales Independent study time
1-6	Theory lectures	16	10
1-6	Group discussions	5	15
1-6	Practical lectures	4	15
7	Advanced seminars	10	

*Este cronograma tiene carácter orientativo.