

Guía docente / *Course Syllabus*

2018-19

1. Descripción de la Asignatura / *Course Description*

Asignatura <i>Course</i>	FÍSICA (docencia en inglés)
Códigos <i>Code</i>	202101
Facultad <i>Faculty</i>	Facultad de Ciencias Experimentales
Grados donde se imparte <i>Degrees it is part of</i>	Grado en Biotecnología
Módulo al que pertenece <i>Module it belongs to</i>	Física, matemática e informática para las biociencias moleculares
Materia a la que pertenece <i>Subject it belongs to</i>	Física
Departamento responsable <i>Department</i>	Sistemas Físicos, Químicos y Naturales
Curso <i>Year</i>	1º
Semestre <i>Tern</i>	1º
Créditos totales <i>total credits</i>	6
Carácter <i>Type of course</i>	Básica
Idioma de impartición <i>Course language</i>	Inglés
Modelo de docencia <i>Teaching model</i>	B1

Clases presenciales del modelo de docencia B1 para cada estudiante: 27 horas de enseñanzas básicas (EB), 18 horas de enseñanzas prácticas y de desarrollo (EPD) y 0 horas de actividades dirigidas (AD). Hasta un 10% de la enseñanza presencial puede sustituirse por docencia a distancia (también presencial, pero posiblemente asincrónica), de acuerdo con la programación de la Asignatura publicada antes del comienzo del curso.

Number of classroom teaching hours of B1 teaching model for each student: 27 hours of general teaching (background), 18 hours of theory-into-practice (practical group tutoring and skill development) and 0 hours of guided academic activities. Up to 10% of face-to-face sessions can be substituted by online teaching, in accordance with the course schedule published before it begins.

2. Responsable de la Asignatura / *Course Coordinator*

Nombre <i>Name</i>	María Carmen Gordillo Bargueño
Departamento <i>Department</i>	Sistemas Físicos, Químicos y Naturales
Área de conocimiento <i>Field of knowledge</i>	Física Aplicada
Categoría <i>Category</i>	Profesora Titular de Universidad
Número de despacho <i>Office number</i>	22.2.14
Teléfono <i>Phone</i>	954-97-79-37
Página web <i>Webpage</i>	https://www.upo.es/fcex/contenido?pag=/portal/upo/profesores/cgorbar/profesor&menuid=&vE=D55929
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3. Ubicación en el plan formativo / *Academic Context*

Breve descripción de la asignatura <i>Course description</i>	This basic course collects all the physical concepts that will be needed in the following years, providing the students with the basic mathematical tools to interpret and report properly the experimental results obtained in the laboratory
Objetivos (en términos de resultados del aprendizaje) <i>Learning objectives</i>	a) Know how to use correctly the different systems of units, and to assess the result of an experiment through a proper analysis of the measurements obtained. b) Have an adequate knowledge of Mechanics and Physics of Fluids, in order to understand the engineering problems related to Biotechnology. c) Know enough about the basic principles of Electricity, Magnetism, Optics and Radioactivity to grasp the fundamentals of the analytical techniques used in Biotechnology.
Prerrequisitos <i>Prerequisites</i>	None
Recomendaciones <i>Recommendations</i>	Students should have a working knowledge of basic mathematics. In particular, they should know how to solve linear and quadratic equations and simple sets of linear equations. Trigonometry and the properties of logarithms and determinants are also included in this necessary previous knowledge.
Aportaciones al plan formativo <i>Contributions to the educational plan</i>	This course aims to provide the student with the necessary basic knowledge to understand and identify the physical processes involved in any context related to Biotechnology, especially in applications related to engineering and the fundamentals of analytical techniques.

4. Competencias / *Skills*

Competencias básicas de la Titulación que se desarrollan en	CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la
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<p>la Asignatura <i>Basic skills of the Degree that are developed in this Course</i></p>	<p>educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio</p> <p>CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio</p> <p>CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética</p> <p>CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado</p> <p>CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía</p>
<p>Competencias generales de la Titulación que se desarrollan en la Asignatura <i>General skills of the Degree that are developed in this Course</i></p>	<p>CG4 - Comprender el método científico. Conocer, entender y aplicar las herramientas, técnicas y protocolos de experimentación en el laboratorio y adquirir las capacidades de observación e interpretación de los resultados obtenidos.</p> <p>CG5 - Adquirir las habilidades adecuadas a cada una de las materias impartidas, mediante la descripción, cuantificación, análisis y evaluación crítica de los resultados experimentales obtenidos de forma autónoma.</p> <p>CG13 - Ser consciente de la importancia del trabajo en equipo y potenciación de la discusión crítica de objetivos comunes.</p> <p>CG23 - Saber analizar, sintetizar y utilizar el razonamiento crítico en ciencia.</p> <p>CG24 - Comprensión de los mecanismos básicos de análisis y diseño de sistemas descendente y ascendente para la resolución de problemas y procesos complejos.</p>
<p>Competencias transversales de la Titulación que se desarrollan en la Asignatura <i>Transversal skills of the Degree that are developed in this Course</i></p>	
<p>Competencias específicas de la Titulación que se desarrollan en la Asignatura <i>Specific competences of the Degree that are developed in the Course</i></p>	<p>CE24 - Tener una adecuada comprensión del concepto de medida en ciencia, incluyendo el uso correcto de los sistemas de unidades y el significado y manejo de los errores involucrados en cualquier medición.</p> <p>CE56 - Conocer e identificar los procesos físicos involucrados en cualquier contexto relacionado con la Biotecnología, así como sus bases Físicas, especialmente en aplicaciones relacionadas con la ingeniería y las técnicas analíticas.</p>
<p>Competencias particulares de la asignatura, no incluidas en la memoria del título <i>Specific skills of the Course, not included in the Degree's skills</i></p>	<p>The student must acquire a working knowledge of the following topics,</p> <p>Measurement in science: systems of units and interpretation of experimental data.</p> <p>Principles of Mechanics: Kinematics and dynamics.</p> <p>Fluid Mechanics.</p> <p>Electric and magnetic fields.</p> <p>Waves.</p>

5. Contenidos de la Asignatura: temario / Course Content: Topics

TEMA 1	INTRODUCTION AND BASIC CONCEPTS
1.1	Methodology of the course
1.2	Definition of Physics and its relation to other Sciences
1.3	Scientific method
TEMA 2	MECHANICS
2.1	Straight-line motion: displacement, velocity and acceleration
2.2	Motion with constant acceleration: free fall
2.3	Projectile motion
2.4	Uniform circular motion
2.5	Newton's laws
2.6	Gravitation. Definition of weight
2.7	Friction
2.8	Work
2.9	The work-energy theorem
2.10	Conservative forces: potential energy
2.11	Law of Conservation of Energy
TEMA 3	FLUIDS
3.1	Ideal fluids
3.2	Archimedes' Principle
3.3	The equation of continuity
3.4	Brenoulli's equation
3.5	Real fluids: viscosity
3.6	Poiseuille's law
3.7	Surface tension
3.8	Wetting
TEMA 4	ELECTRIC AND MAGNETIC FIELDS
4.1	Electric charges: history, types and conservation
4.2	Coulomb's law
4.3	Principle of superposition
4.4	Electric field
4.5	Electric dipoles
4.6	Electric potential
4.7	Electric current
4.8	Ohm's law. Resistivity
4.9	DC circuits: Kirchhoff's rules
4.10	Magnetic phenomena: Lorentz force
4.11	Mass spectrometry
TEMA 5	WAVES. OPTICS
5.1	Waves
5.2	Wave types

5.3	Wave equation
5.4	Interference
5.5	Standing waves
5.6	Power and intensity of waves
5.7	Sound. Sound intensity: decibels
5.8	Light waves
5.9	Reflection and refraction
5.10	Thin lens formula
5.11	Lensmaker's equation
TEMA 6	NUCLEAR PHYSICS
6.1	The atomic nucleus
6.2	Nuclear reactions: radioactivity
6.3	Radioactive dating

6. Metodología y recursos / *Methodology and Resources*

Metodología general <i>Methodology</i>	Of the 45 hours of face-to-face class time, 27 will be devoted to the background concepts. Those will be complemented by six three-hour practice sessions (18 hours in total), with at most a session per week.
Enseñanzas básicas (EB) <i>General teaching</i>	These classes will consist of presentations and practical applications of the concepts introduced, mainly in the form of problems to solve. To have a copy of the teacher presentations is highly recommended, but not mandatory. Those copies can be downloaded at no cost from the Blackboard platform. Problem collections will be given to students in advance to be solved in class, either individually or in small groups.
Enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice</i>	<p>The goal of the first mandatory five classes will be to teach the students how to analyze mathematically the results obtained in the lab and to complete a project on the subject of the comparison of experimental data to the pertinent physical laws. To do so, the class will be divided in groups of 4-6 students who will work together throughout the semester. The schedule for these theory-into-practice classes is:</p> <p>1st week. Measurement of experimental data designed to test the laws of motion and some properties of fluids. Each group of students will be split in order to have at least two sets of data. Thus, they will be able to address questions of reproducibility.</p> <p>2nd week. The fundamentals of error theory and the concept of correlation will be explained. The mathematical operations and the graphical representations will be done with the Excel program, so its use will be explained using a standard set of data.</p> <p>3rd week. How to estimate errors in indirect measurements will be explained.</p> <p>4th week. Each group will work autonomously under the teacher supervision. They will have to prove if their experimental data are compatible with the laws they are testing. The fundamentals of the Power Point program will be also explained.</p>

	<p>5th week. Each group will deliver a brief talk of about 20' on the main findings of their project, using a Power Point presentation as a support. All students of each group will be expected to participate in the talk, their intervention order chosen at random at the beginning of the corresponding session. At the end of the talk, the professor will ask some questions to check if every member of the group has enough knowledge of the work done. This session will end with an individual test designed to assess if all the students know how to perform error calculations.</p> <p>The sixth practice session will be voluntary and will be devoted to solve problems of the same type that the ones the students will find in the writing exam.</p>
<p>Actividades académicas dirigidas (AD) <i>Guided academic activities</i></p>	Not applicable

7. Criterios generales de evaluación / Assessment

<p>Primera convocatoria ordinaria (convocatoria de curso) <i>First session</i></p>	<p>El 40% de la calificación procede de la evaluación continua. El 60% de la calificación procede del examen o prueba final. The course evaluation will be divided in two parts,</p> <p>1. The assessment of the Power Point presentation described previously. This will give us a unique grade for all students in the group, in the range 0-10 points. That common grade will be multiplied by a coefficient in the 0-1 range from an anonymous assessment made by his/her fellow students. To obtain it, a survey will be provided to each student in a group in which he/she will have to give a grade in the 0-1 range to all its members, including herself / himself. If everybody has contributed equally to the work done, that grade should be 1 for all the members of the group, but if there is someone who worked less, his/her grade should be lower than 1 or even 0. The coefficient for each student will be the average of the grades awarded to him/her by all the members of the group. In addition, if a student does not show up in one or several practice sessions, her/his grade will be multiplied by the ratio of the attended ones to their total number of mandatory sessions. The total weight of this part in the final grade is 30%</p> <p>2. The grade of the individual test on error calculations to check if the students know how to calculate errors. This grade will be also in the range 0-10, and its weight in the final mark is 10%. An individual exam to be performed at the end of the semester will evaluate the concepts taught in the background classes (theory) . The grade awarded for this exam will be in the range 0-10 and its weight in the final grade will be 60%. However, to pass the course, the grade awarded in this test should be at least 3.5 out of 10, irrespectively of the grades of the other parts.</p>
<p>Segunda convocatoria ordinaria (convocatoria de recuperación) <i>Second session (to re-sit the exam)</i></p>	<p>If the student does not pass the course, a new individual exam will take place in July, with the same structure and with the same weight in the total grade as in February. The final grade in July will be the weighted sum of the grade of the final exam in July and the practical session's grade obtained during the first semester. However, the student will also have the right to repeat individually the Power Point to improve his/her grade using new data given to</p>

	<p>him/her by the professor, doing also again the error test. To do so, the student must send the professor a signed statement indicating explicitly that (s)he renounces his/her practical sessions' grade at least ten days before the date fixed for the July exam. If the student passes the individual exam, (s)he will have the right to keep that grade and repeat only the practice part of the assessment.</p>
<p>Convocatoria extraordinaria de noviembre <i>Extraordinary November session</i></p>	<p>Se activa a petición del alumno siempre y cuando éste esté matriculado en todas las asignaturas que le resten para finalizar sus estudios de grado, tal y como establece la Normativa de Progreso y Permanencia de la Universidad. Se evaluará del total de los conocimientos y competencias que figuren en la guía docente del curso anterior, mediante el sistema de prueba única. The test will be the same as the one already described, byut it will include a question about error calculation, and another one about interpretation of least-squared fitted results</p>
<p>Criterios de evaluación de las enseñanzas básicas (EB) <i>General teaching assessment criteria</i></p>	<p>Durante la evaluación continua: Not applicable Durante el examen o prueba final (1ª convocatoria): The maximum grade on each part of each problem will be indicated in the problem. If the problem is solved correctly and the numerical result is right, the student will have that maximun grade. If the solution is physically sound but the number given is wrong, the grade will be 60% of the maxuimum. In all other cases, the grade will be 0. Durante el examen o prueba final (2ª convocatoria): Same as the already described in the first assessment</p>
<p>Criterios de evaluación de las enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice assessement criteria</i></p>	<p>Durante la evaluación continua: The following criteria will be used</p> <p>1. Have ALL experimental data and ALL graphs been displayed? Yes : 5 No, there are things missing or the some of the graphs are not right: 4 More than 20% of the data are missing or more than two graphs are not right:0.</p> <p>2. Have ALL the uncertainties been well calculated and properly rounded? Yes :1 No: 0</p> <p>3. Does the powerpoint have all these parts? • Introduction • Method • Materials • Results • Conclusions Yes : 1 No : 0</p> <p>4. Is the powerpoint easy to understand? Yes : 1 No : 0</p> <p>5. Do the all the students in the group know how to answer the questions properly? Yes : 2 Not really : 1 There is at least a student that reads literally the presentation on the screen or does not know how to answer a question: 0</p>

	Durante el examen o prueba final (1ª convocatoria): Not applicable Durante el examen o prueba final (2ª convocatoria): If the student have to make an individual Power point, (s)he will have to deliver a talk under the same conditions as in the first assessment. (S)he will also have to repeat the error test.
<p> Criterios de evaluación de las actividades académicas dirigidas (AD) <i>Criteria of assessment of guided academic activities</i> </p>	<p> Durante la evaluación continua: Not applicable Durante el examen o prueba final (1ª convocatoria): Not applicable Durante el examen o prueba final (2ª convocatoria): Not applicable </p>
<p> Puntuaciones mínimas necesarias para aprobar la Asignatura <i>Minimum passing grade</i> </p>	<p> 1ª convocatoria: To to pass the course, the grade awarded in the theoretical test should be at least 3.5 out of 10, irrespectively of the grades of the other parts. If the student does not pass the course, this official grade (the one in the “actas”, will be the result of the individual theoretical exam). If the grade in the theoretical test is equal or above 3.5, the student will pass the topic if the total grade is equal or above 5. 2ª convocatoria: Same as in the first assessment </p>
<p> Material permitido <i>Materials allowed</i> </p>	In the exams, the students will be allowed to use a non-programmable calculator only
<p> Identificación en los exámenes <i>Identification during exams</i> </p>	En cualquier momento de la realización de una prueba de evaluación los profesores podrán requerir la acreditación de la identidad de cualquier estudiante, mediante la exhibición de su carnet de estudiante, documento nacional de identidad, pasaporte u otro documento válido a juicio del examinador. Si no lo hiciese, el estudiante podrá continuar la prueba, que será calificada solo si la documentación es presentada en el plazo que el examinador establezca.
<p> Observaciones adicionales <i>Additional remarks</i> </p>	

Los estudiantes inmersos en un programa de movilidad o en un programa de deportistas de alto nivel, así como los afectados por razones laborales, de salud graves o por causas de fuerza mayor debidamente acreditadas, tendrán derecho a que en la convocatoria de curso se les evalúe mediante un sistema de evaluación de prueba única. Para ello, deberán comunicar la circunstancia al profesor responsable de la asignatura antes del fin del periodo docencia presencial.

Students enrolled in a mobility program or a program for high-level athletes, as well as students affected by work or serious health problems or reasons of force majeure duly accredited, will have the right to be evaluated during the first session through a single test evaluation system. To do this, they must report changes in their circumstances to the program coordinator before the end of the teaching period.

8. Bibliografía / Bibliography

Textbook	<ul style="list-style-type: none"> Giancoli, D.C. (2005) “Physics: Principles with Applications (6th Edition)”, <i>Pearson-Prentice Hall</i>
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