Universidad de Navarra

Physics (F.Ciencias)
Guía docente 2026-27

PRESENTATION

Brief description: In this course, the essential concepts of physics needed for a degree in environmental sciences, biology, or biochemistry will be developed. Attention will be primarily given to understanding concepts and operative knowledge.

- **Titulación**: Biochemistry, Biology, Environmental Sciences
- **Módulo/Materia**: Biochemistry: (iii) Physics, mathematics, and computer science for molecular biosciences / (i) Physics. Biology: (i) Instrumental subjects applied to biology / (iii) Physics. Environmental Sciences: (i) Scientific background for the environment / (i) General scientific background
- **ECTS**: 6
- **Curso, semestre**: First year, first and second semesters
- **Carácter**: Required Course in the curricula
- **Profesorado**: Raúl Cruz Hidalgo (Dr. rer. nat.),
- **Idioma**: English
- **Aula, Horario**: TBA

PROGRAM

Part 1. Equilibrium and Motion. Energy and Work

Motion. Newton's laws. Mechanical equilibrium. Conservation laws (linear momentum and energy). Applications.

Part 2. Continuum mechanics.

Fluids, Hydrostatics. Deformable solids. Hydrodynamics. Flows and viscosity. Applications.

Part 3. Introduction to Thermodynamics

Heat and temperature. First law of thermodynamics. Heat transfer. Biophysical applications.

Part 4. Sound. Electricity

Mechanical waves. Sound transmission. Electricity. Capacitance. Electric current. Resistance. Introduction to magnetism. Applications.

Part 5. Optics.

Light, Snell's law, and polarization. Geometric optics. Compound optical systems. Applications.

LABS

1) Sedimentation. Stokes' law. Viscosity

2) Refractive index. Total internal reflection. Geometrical optics

ACTIVITIES

Universidad de Navarra

The evaluation of the scope of the proposed objectives in this subject and the acquisition of the corresponding skills and abilities is carried out through different activities:

- Attendance and active participation in class.
- Lab sessions
- Multiple choice quizzes
- Individual or group tutoring
- Final exam(s)

ASSESSMENT AND GRADING

The subject must be passed through the final exam or the continuous assessments. For the final grade of the course, the following aspects will be taken into account:

- **Laboratory sessions.** They are required. If a student doesn't attend these sessions or doesn't deliver the corresponding reports in time, the final grade of the subject will be NP in both calls, **regardless** of the performance of the student in the subject in the following items.
- Laboratory sessions will give the student a qualitative mark (+ vs -), which may be considered in the subject's final grade, in the case of borderline grades.

CONTINUOUS ASSESSMENT

- For each course module (see Syllabus section), students will take a multiple-choice exam composed of practical problems. Students have the option to pass the course entirely via continuous assessment (see details above).
  - Each quiz will have a variable number of exercises, usually numerical, in which the wrongly answered questions may subtract points. If the (global) mark of a quiz is negative, it will be considered a 0. The mark of the quiz will be obtained from the result of multiplying the obtained points by 10/N, where N is the number of questions in the quiz.
  - If a student does not show up (even for justified cause) to a quiz, the grade remaining in the quiz will be 0. The quizzes will **not** be repeated.
- **IMPORTANT: Students may complete the course entirely via continuous assessment,** provided they achieve a score of **7.0 or above** on at least **4 of the 5 tests**. For qualifying students, the final course grade will be calculated as the average of these assessment results.
  - For the purpose of computing the final grade, additional points will be given by adding the arithmetic mean of the 3 highest quiz scores divided by 10 (a maximum of 1.0 points).
  - For the continuous evaluation to be considered in the final mark, it will be necessary to obtain at least a mark of 4 out of 10 in the final exam.

FINAL EXAM (FIRST CALL)

- If the student does not pass the course through continuous assessment, and does not show up for the final exam, the final grade will be NP.

Universidad de Navarra

- If the student does pass the course through continuous assessment (and does not take the exam), the final grade will be the average of the continuous assessment results.
- The final exam will consist of a multiple-choice exam.
- If a given question is answered correctly, 1 point is awarded.
- Incorrectly answered questions may subtract points.

- The exam grade will be obtained by multiplying the points obtained by 10 /N, N being the number of exam questions.
  - If the exam mark is negative, the final grade in the subject will be 0.
  - If the exam mark is less than 4, the exam mark will be the final grade in the subject.
- If the exam mark is greater than or equal to 4, then the additional points obtained in continuous assessment will be added to the exam grade to obtain the final grade (up to a maximum of 10 points).

FINAL EXAM (SECOND CALL)

- If a student takes the second call for the subject (according to the "normativa de evaluación" of the University of Navarra), the continuous evaluation marks obtained by the student are maintained. The mark of the final exam of the first call is without effect.
- The type of exam, the method of calculating the mark of the final exam (second call), and the final grade of the subject are the same as in the first call.

Warning: Information on these web pages will be updated, and the instructor may modify this syllabus as necessary at any time. Changes will be announced in the classroom during the course: these oral notices are the ultimate information source. Students are responsible for keeping updated with information about evaluation procedures, timetable changes, notices about activities, and other aspects of the course.

Academic integrity

During an assessment activity, the use of any material not explicitly authorized by the course director, as well as any unauthorized action that could be directed to obtaining or exchanging information with other people, will be the object of academic sanction: a 0 in such evaluation activity. Recurrence will imply a global 0 in the first and second calls. In case of doubt, consult it before starting the corresponding assessment activity. These actions may also imply initiating disciplinary proceedings according to the University of Navarra regulation.

VERY IMPORTANT: In the event that any **exam or coursework submission** appears to be AI-generated, the professor will meet with you to discuss your answers prior to making a final decision regarding your grade.

OFFICE HOURS

Dr. Raúl Cruz Hidalgo (raulcruz@unav.es)

- Office 0-210, Dpto. de Física y Matemática aplicada, Ed. Los Castaños
- Wednesdays 16:00-18:00 and Thursday 17:00-19:00. Schedule a meeting by email.

Universidad de Navarra

RESULTADOS DE APRENDIZAJE (Competencias)

These statements are excerpts from an official document for which no approved translation is available yet.

GRADO DE BIOLOGÍA

Competencias específicas:

CE1 Plantearyresolverproblemascualitativosycuantitativosenbiologíaa través dehipótesis científicasquepuedanexaminarseempíricamente y quesebasenenlosconocimientos y teoríasdisponibles.

CE10 Comprender las bases de Física relevantes para entender los procesos biológicos y los seres vivos, así como para poder aplicar con criterio las técnicas de observación, medida y experimentación propias de la Biología.

Competencias generales y básicas:

CB1 Que los estudiantes hayan demostrado poseer y comprender conocimientosenun áreadeestudio quepartedelabasedela educaciónsecundaria general,ysesueleencontrara unnivel,quesi bienseapoyaenlibrosdetextoavanzados, incluyetambiénalgunos aspectos queimplicanconocimientos procedentesdelavanguardia desucampodeestudio.

CG1 Planificar y organizar el tiempo y gestionar la propia formación continua, actualizando el conocimiento de las innovaciones del ámbito científico y saber analizar las tendencias de futuro.

CG2 Pensar de forma integrada y abordar los problemas desde diferentes perspectivas. Tener razonamiento crítico. Aportar soluciones a problemas en el ámbito científico.

GRADO DE BIOQUÍMICA

Competencias específicas:

CE4 Conocer bien los fundamentos de la Física relevantes para entender los procesos biológicos y bioquímicos y adquirir destreza en las operaciones experimentales básicas para trabajar de forma segura y eficaz en un laboratorio.

Competencias generales y básicas:

CB1 Que losestudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la basede la educación secundariageneral,y se suele encontrar aun nivel, que sibien se apoya en libros de texto avanzados, incluye también algunos aspectosque implican conocimientosprocedentes de la vanguardia de su campode estudio.

CG2 Pensar de forma integrada y abordar los problemas desde diferentes perspectivas. Tener razonamiento crítico. Aportar soluciones a problemas en el ámbito científico.

GRADO DE CIENCIAS AMBIENTALES

Competencias específicas:

CE1 Conocer las bases científicas necesarias para afrontar la formación específica ambiental.

CE2 Aplicar la terminología y unidades de medida de los procesos físicos

CE3 Describir la estructura, propiedades físico-químicas y reactividad de los elementos y compuestos implicados en los procesos biogeoquímicos.

CE4 Utilizar en el laboratorio las técnicas e instrumentos propios de la experimentación científica.

Competencias generales y básicas:

CB1 Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la 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

CG2 Pensar de forma integrada y abordar los problemas desde diferentes perspectivas.

- CG3 Tener razonamiento crítico.