1. OVERVIEW

Subject Area	Bioinformatics
Degree	Bachelor's Degree in Biotechnology
School/Faculty	Biomedical and Health Sciences
Year	3
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery Mode	On campus
Semester	First semester
Academic Year	2024/2025
Coordinating professor	Jon Del Arco Arrieta
Teacher	

2. INTRODUCTION

Bioinformatics is a compulsory subject worth 6 ECTS and is taught in the first semester of the third year of the Bachelor's Degree in Biotechnology. This subject belongs to the INSTRUMENTAL METHODS AND BIOCHEMICAL ENGINEERING module worth a total of 36 ECTS.
The main aim of this subject area is to provide students with knowledge of the main biological databases and tools used in the field of biotechnology and biohealth science. Students will learn how to search for and understand information available in databases and how to correctly interpret results obtained from these bioinformatics data tools.

3. LEARNING OUTCOMES (RA, by the acronym in Spanish)

ABILITIES (HAB, by the acronym in Spanish)
HAB04. Design experimental procedures and protocols choosing the most suitable technique in the field of biotechnological research, all the while meeting quality and legislative standards.
• Manage the most commonly used methods for obtaining structural information on biomolecules.
• Use the main databases to identify proteins, genes and so on in the field of biohealth science.
• Design computer-aided structures of biomolecules.

SKILLS
COMP07. Manage databases and IT programs which could be used in the field of biotechnology and interpret the information extracted.
COMP09. Identify and apply tools and techniques used in genetic and genomic engineering, both in experiments and in silico.

4. CONTENTS

- Introduction to bioinformatics.
- Bioinformatics resources on the Internet.
- Biological databases.
- Special software in biohealth sciences.
- Computer-aided design of structures.

The subject area is divided into 6 learning units:

Unit 1. Introduction to Bioinformatics
- 1.1 History of Bioinformatics
- 1.2. Areas of bioinformatics

Unit 2. Bibliographical databases
- 2.1. Basic concepts of bibliographical databases PubMed
- 2.2. OMIM

Unit 3. Nucleic acid databases
- 3.1. Nucleic acid databases: genomes, genes and transcripts
- 3.2. Analysis of DNA sequences

Unit 4. Protein databases
- 4.1. Protein sequence databases
- 4.2. Protein structure databases
- 4.3. Protein sequence analysis
- 4.4. Pairwise sequence alignment
- 4.5. Multiple sequence alignment
- 4.6. Protein domain and family databases

Unit 5. Special software in biohealth sciences
- 5.1. Small molecule databases PubChem and Chemspider

Unit 6. Computer-aided design of structures

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lectures.
- Problem-based learning.
- Project-based learning.
- Simulated environments
- Learning based on workshop teaching

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Lectures	28
Asynchronous master lectures	12
Problem-solving	21
Spoken presentations	2
Written reports and essays	4
Tutorials	15
Independent working	50
Workshops and/or lab work	8
Research (scientific/case studies) and projects	4
On-campus knowledge tests	6
TOTAL	**150**

7. ASSESSMENT

The assessment methods, together with how much they each count towards the final grade for the subject area, are as follows:

On campus:

Assessment system	Weight
On-campus knowledge tests	60%
Reports and written work	10%
Case study/problem scenario	15%
Laboratory practice	10%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a mark of 5.0 or more out of 10.0 in all assessed parts of the subject. Any part you do not pass in the ordinary exam period will need to be recovered in the extraordinary exam period (resits).

Your final grade will be the average of the partial marks in each of the learning activities you have passed. The continuous assessment system for the learning activities requires attendance to at least 50% of the classes.

It is compulsory for students studying degrees on-campus to accredit attendance to at least 50% of classes. This requirement qualifies students for the right to obtain academic counselling, support and monitoring from the professor. Failure to accredit attendance to at least 50% of the classes by any of the means proposed by the University will mean that the professor awarding a fail to the student for that subject area in the ordinary exam period in accordance with the grading system outlined in these regulations. All of the above, without prejudice to the other requirements or higher attendance percentages that other faculties may stipulate in their learning guides or internal regulations. Regulations for the assessment of official degree programmes, Art. 1 point 4.

(*https://universidadeuropea.com/documents/1798/6.__Reglamento_evaluacion_titulaciones_oficiales_grado_UEM_v2.pdf*)

7.2. Extraordinary exam period (resits)

To pass the subject area in the extraordinary exam period (resits), the students must obtain a mark equal to or above 5.0 out of 10.0 in all parts of the subject assessment they did not pass during the ordinary exam period.

The student must submit the activities not passed in the ordinary exam period taking into account the corrections or comments made by the teacher. The student must also submit any activities which were not submitted.

The final grade will be the average of the partial marks in each of the activities passed (with a mark equal to or higher than 5 out of 10). The marks for the assessable activities the student passed in the ordinary exam period will be maintained for calculating this grade.

8. TIMELINE

The timeline with delivery dates of assessable activities in the subject area is indicated in this section:

Assessable activities	Date
Activity 1. Using databases to search for information: PubMed	Week 2
Activity 2. Using databases to search for information: OMIM	Week 3
Activity 3. Using databases to search for information: NCBI I	Week 4
Activity 4. Using databases to search for information: NCBI II	Week 5
Activity 5. Using bioinformatics tools: DNA sequence analysis	Week 6
PBL activity	Week 7
Activity 6. Using databases to search for information: UniProt	Week 8
Activity 7. Using bioinformatics tools: protein sequence analysis	Week 9
Partial knowledge test	Week 10
Activity 8. Using databases to search for information: PDB	Week 11

Practical: individual case solving using the PyMOL program	Week 12
Activity 9. Using bioinformatics tools: similarity searching I	Week 13
Activity 10. Using bioinformatics tools: similarity searching II	Week 14
Activity 11. Using bioinformatics tools: multiple sequence alignment	Week 15
Activity 12. Using databases to search for information: PubChem and Chemspider	Week 15
Partial knowledge test	Week 18

The timeline may be subject to modifications for logistical reasons of the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The reference work for following this subject area is:

- Baxevanis, A. D., Bader, G. D., & Wishart, D. S. (Eds.). (2020). Bioinformatics. John Wiley & Sons.

The recommended bibliography is indicated below:

- Gu, J., & Bourne, P. E. (Eds.). (2009). Structural bioinformatics (Vol. 44). John Wiley & Sons.
- Xiong, J. (2006). Essential bioinformatics. Cambridge University Press.
- Lesk, A. (2019). Introduction to bioinformatics. Oxford university press
- Rosenberg, M. S. (Ed.). (2009). Sequence alignment: methods, models, concepts, and strategies. Univ of California Press.
- Russell, D. J. (Ed.). (2014). Multiple sequence alignment methods. Humana Press.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

The Educational Guidance and Diversity Unit (ODI in Spanish) offers support throughout your time at university to help you with your academic achievement. Other cornerstones of our educational policy are the inclusion of students with special educational needs, universal access in all our university campuses and equal opportunities.

This ODI unit offers students:

1. Support and monitoring through counselling and personalised student plans for those who need to improve their academic performance.
2. Curricular adaptations to uphold diversity, with assistance for those students who require specific educational support, leading to equal opportunities without significant changes to methodology or evaluation.
3. We offer students a range of extracurricular educational resources to reinforce skills which will enhance their personal and professional development.
4. Career guidance by offering tools and advice to students with doubts regarding their professional careers or those who believe they have chosen the wrong line of study.

Students who need educational support can contact us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degree courses and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the course.

Many thanks for taking part.