1. OVERVIEW

Subject Area	Molecular Pathology
Degree	Bachelor's Degree in Biotechnology
School/Faculty	Biomedical and Health Sciences
Year	3
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish and English
Delivery Mode	On campus
Semester	First semester
Academic Year	2024/2025
Coordinating professor	Emma Muñoz Sáez

2. INTRODUCTION

Molecular Pathology is the science which studies the underlying alterations of structure and function of biomolecules in pathologies and particularly in hereditary diseases. In this field, Biochemistry and Molecular Biology techniques have been used to study diseases for greater understanding of their molecular basis, thus providing an essential tool for improving diagnosis and treatment.

Students will acquire knowledge of clinical biochemistry and underlying molecular mechanisms in pathologies associated with our genetic material, metabolism and physiology of our systems.

To study this subject, we recommend having acquired basic knowledge of biochemistry, genetics, molecular genetics and physiology.

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

KNOWLEDGE (CON, by the acronym in Spanish)

CON05. Understand the molecular aspects of pathologies and the mechanisms, as well as the fundamentals of diagnosis and treatment of diseases.

- Know the principles of molecular pathology and the basic molecular characteristics of diseases.
- Understand the molecular mechanisms of genetic and metabolic regulation.
- Be aware of the relevance of molecular diagnosis in different pathologies.
- Acquire knowledge of the different molecular techniques and methods as well as their use in clinical practice.
- Understand the molecular basis of pharmacological treatment.

SKILLS

COMP05. Propose, redact and execute small R&D and innovation projects related to biotechnology, following current rules and regulations.
COMP11. Interpret how genetic and metabolic regulation can adapt to physiological and/or pathological changes.

4. CONTENTS

- Applications of molecular pathology.
- Molecular basis and pathogenesis of diseases and molecular disorders.
- Types of molecular pathology.
- Molecular and cellular basis of cancer, ageing and degenerative diseases, autoimmune diseases, metabolic diseases, cardiovascular risk factors and rare disorders.
- Practical methods in the study and analysis of pathologies.
- Pathogenesis and diagnosis of infectious diseases.
- Molecular and molecular diagnosis techniques.
- Molecular aspects of pharmacological treatment.

The subject area is divided into seven learning units, which are then divided into topics (four to five topics depending on the unit):

Unit 1: Introduction and the molecular basis of genetic diseases.

Topic 1. Molecular origin of disease and types of molecular pathology
Topic 2. Pathogenesis and diagnosis of genetic disorders
Topic 3. General methods and techniques of molecular diagnosis
Topic 4. Treatment of genetic disorders

Unit 2: Molecular basis of metabolic alterations

Topic 5. Carbohydrate metabolism alterations
Topic 6. Lipid metabolism alterations
Topic 7. Amino acid metabolism alterations
Topic 8. Nitrogen compound metabolism alterations
Topic 9. Haem group and iron metabolism alterations

Unit 3: Molecular basis of systemic alterations

Topic 10. Molecular basis of cancer
Topic 11. Molecular basis of ageing
Topic 12. Molecular basis of some neurodegenerative diseases
Topic 13. Molecular basis of some autoimmune diseases
Topic 14. Pathogenesis and diagnosis of infectious diseases

Unit 4: Applications of molecular pathology in biotechnology

Topic 15. Molecular aspects of pharmacological treatment

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Collaborative learning.
- 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	37
Asynchronous master lectures	15
Case Studies	10
Spoken presentations	4
Written reports and essays	5
Tutorials	15
Independent working	50
Workshops and/or lab work	9
Knowledge tests	5
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	Weighting
Knowledge test	60%
Spoken presentations	10%
Reports and written work	5%
Case study/problem scenario	10%

Laboratory work	15%

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. Interpretation of genealogical trees	Week 4-5
Activity 2. Practical 1. Virtual simulation on prenatal diagnosis	Week 5-6
Activity 3. Practical 2. Clinical cases on molecular pathology	Week 7-8
Activity 4. Objective test - mid term	Week 8-9
Activity 5. Practical 3. Clinical cases on molecular pathology	Week 12-13
Activity 6. Seminar on the pathology of ageing	Week 15-16
Activity 7. Seminar on the pathology of neurodegenerative diseases	Week 16
Activity 8. Final objective test	Week 17

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:

- González Hernández A., (2019) *Principios de bioquímica clínica y patología molecular*, 3ª Edición. Editorial Elsevier
- Coleman W.B., Tsongalis G.J., (2009) *Molecular Pathology. The Molecular Basis of Human Disease.* Academic Press 2009

The recommended bibliography is indicated below:

- Kumar V, Abbas AK, Fausto N y Mitchell R., (2008) *Robbins. Patología Humana*. 8ª Edición. Editorial Elsevier.
- Marshall WJ, Bangert SK, Lapsley M., (2013) *Bioquímica clínica*. 7ª Edición. Editorial Elsevier.
- Swanson TA, Kim SI y Glucksman MJ. (2010) *Biochemistry, Molecular Biology and Genetics*. 5ª Edición. Editorial Lippincott
- Kaplan LA, Pesce AJ. (2010) *Clinical Chemistry. Theory, analysis and correlation*. Editorial Elsevier Baynes J.W. y Dominiczak M.H., (2006) *Bioquímica Medica*. Editorial Elsevier

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 degree.

Many thanks for taking part.