VNIVERSITAT DE VALÈNCIA

Course Guide
43099 Biochemical basis of immunology: Principles and applications

COURSE DATA

Data Subject	
Code	43099
Name	Biochemical basis of immunology: Principles and applications
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
2142 - Master's Degree in Molecular Approaches in Health Sciences	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2142 - Master's Degree in Molecular Approaches in Health Sciences	1 - Molecular technologies for research in health sciences	Obligatory

Coordination

Name	Department
CASTELL RIPOLL, JOSE VICENTE	30 - Biochemistry and Molecular Biology
O'CONNOR BLASCO, JOSE ENRIQUE	30 - Biochemistry and Molecular Biology

SUMMARY

In the course of Immunology Biochemical Bases: Fundamentals and Applications, will study the molecular and cellular interactions that regulate the maturation, activation, differentiation, and apoptosis inhibition of immune cells in normal and pathological conditions.

The course also aims to highlight the fundamentals and applications in research and clinical diagnosis of new technologies based on cellular and molecular analysis in Immunology. To do this, there will be also attended by invited lecturers, renowned international experts in immunology. Through laboratory sessions and workshops, students solve experimental examples represent advanced applications of Immunology in Biomedicine.

The course also has a part laboratory equivalent of 10 hours, which will address the technical basis, the interest and the use of relevant immunological techniques. Through laboratory sessions, the student will understand its application to solving practical real situations in the context of research in Health Sciences.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

None.

2142 - Master's Degree in Molecular Approaches in Health Sciences

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Tener capacidad de analizar y sintetizar un problema.
- Tener capacidad de comunicación oral y escrita en una segunda lengua científica.
- Tener capacidad de localizar información.
- Tener capacidad de desarrollar un trabajo interdisciplinar.
- Conocer y comprender los conceptos básicos y las aplicaciones en investigación básica y clínica de la Metodología y Técnicas Inmunológicas de Investigación.
- Conocer, comprender y aplicar en la práctica la Metodología y Técnicas Inmunológicas de Investigación en situaciones relacionadas con la investigación básica y clínica.
- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre la Metodología y Técnicas Inmunológicas de Investigación, usando como vehículo la lengua inglesa.

- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre Citómica, usando como vehículo la lengua inglesa.
- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre células madre, usando como vehículo la lengua inglesa.

1. To know and to understand the basic concepts and applications of Immunology in basic and clinical research.

2. To know,to understand and to apply in practice instruments of Immunology in situations related to basic and clinical research.

3. To learn to identify, to manage and to present properly in reports or public exhibitions, existing knowledge on Immunology, using the English language as a vehicle.

DESCRIPTION OF CONTENTS

1. Tema 1. Introduccion a la Inmunología y al Sistema Inmunitario.

2. Tema 2. Los desafíos al Sistema Inmunitario: Patógenos y antígenos.

3. Tema 3. Las herramientas del Sistema Inmunitario: Evolución, desarrollo y maduración.

4. Tema 4. El reconocimiento inmunitario de lo propio y lo potencialmente peligroso.

5. Tema 5. Sensores inmunitarios del mundo antigénico: Receptores celulares y moléculas libres.

6. Tema 6. La comunicación intercelular y el tráfico celular en el Sistema Inmunitario

7. Tema 7. Mecanismos efectores de la respuesta inmunitaria.

8. Tema 8. Mecanismos de regulación de la respuesta inmunitaria.

9. Tema 9. La respuesta inmunitaria en acción (I): El ejemplo de la Covid-19.

10. Tema 10. La respuesta inmunitaria en acción (II): El ejemplo del cáncer.

11. Tema 11. La respuesta inmunitaria en acción (III): El ejemplo del transplante.

12. Tema 12. Integración de la respuesta del Sistema Inmunitario.

13. Tema 13. Inmunodeficiencias.

14. Tema 14. Enfermedades autoinmunitarias.

15. Tema 15. Reacciones de hipersensibilidad.

16. Seminario 1: Técnicas moleculares para el estudio experimental y diagnóstico del Sistema Inmunitario.

17. Seminario 2: Técnicas celulares para el estudio experimental y diagnóstico del Sistema Inmunitario

18. Práctica 1: Análisis por citometría de flujo del inmunofenotipo de poblaciones leucocitarias.

19. Práctica 2: Análisis por citometría de flujo de la fagocitosis.

20. Práctica 3: Análisis por citometría de flujo de la desgranulación de basófilos.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Group work	5,00	100
Seminars	5,00	100
Attendance at events and external activities	5,00	0
Development of individual work	20,00	0
Study and independent work	20,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The subject is devised to be developed in the form of face and non-face work.

Actual teaching of this subject will be made by the following methodological approaches: lectures, labs, workshops and tutoring assistance. 25% of the course will be taught in English.

In the lectures, professor will present an overview of the topic, with special emphasis on the key concepts. At the same session, professor will indicate the most appropriate resources for a deepening of the subject so that students complete their education in the same. In the laboratory practicals and workshops, students will solve technical and experimental examples representing major applications of Immunology in Biomedicine.

EVALUATION

The evaluation of student learning will be carried out by assessing the following sections:

1. Evaluation of the theoretical and practical contents of each one of the blocks of the subject, with questions of different formats.

This test will be worth up to 50% of the final grade and will be carried out by means of a written test at the end of the teaching of the subject.

2. Writing and presentation of a practical work on Immunopathology, which will have a value of up to 40% of the final grade.

3. The student's interest in the subject, expressed as their participation in the organized discussions, the answers to the questions asked by the teacher during the face-to-face sessions, attendance at personal tutorials and/or any other type of activity carried out by the student in relation to the subject.

From the evaluation of these concepts, up to 10% can be achieved in the final grade of the subject.

REFERENCES

Basic

- K. Abbas, A. H. Lichtman y S. Pillai. Inmunologia celular y molecular, Editorial Elsevier.
- C.A. Janeway, P. Travers, M- Walport y J.D. Capra. Inmunobiología. El sistema inmunitario en condiciones de salud y enfermedad, Editorial Masson.
- T. J. Kindt, R.A. Goldsby y B. A. Osborne. Inmunología de Kuby, Editorial McGraw-Hill.
- D. Male, J. Brostoff, D. B. Roth e I. Roitt. Inmunología, Editorial Elsevier-Masson.

Additional

- Immunology. Wikibooks. http://en.wikibooks.org/wiki/Immunology
- Frank, SA (2007) Immunology and Evolution of Infectious Disease. Princeton University. Press. https://stevefrank.org/antiVar/antiVarCut.pdf
- Immunology. Wikibooks. http://en.wikibooks.org/wiki/Immunology
- Essential Clinical Immunology, Edited by Zabriskie, JB. Cambridge University Press http://sacema.org/uploads/Essential-Clinical-Immunology.pdf