

## SUBJECT TEACHING GUIDE

G1939 - Immunopathology and Immunotherapy

Degree in Biomedical Sciences

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Biomedical Sciences			Type and Year	Compulsory. Year 3
Faculty	Faculty of Medicine				
Discipline	IMMUNOLOGY				
Course unit title and code	G1939 - Immunopathology and Immunotherapy				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

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### 3.1 LEARNING OUTCOMES

- To apply the basis of Immunology to the field of biomedical sciences .
  - To identify the mechanisms used by the immune system to recognize antigens and other danger signals in the microenvironment.
  - To distinguish the cellular and molecular mechanisms involved in innate and adaptive immune responses .
  - To list and know about the molecules involved in the activation and regulation of the immune response .
  - To identify the relationship between the immune system and the microbiota .
  - To nominate the patterns of immune response against different types of pathogens .
  - To apply the tools of the immune system to the rational and industrial design of vaccines .
  - To use and correctly manage information sources in Immunology .
  - To apply correctly the laboratory techniques to study the immune response .
  - To identify the principles of the generation and clinical use of monoclonal antibodies and other types of biological drugs and their application to the treatment of diseases.
- To identify the cellular and molecular bases of the generation and treatment of autoimmune , allergic and autoinflammatory diseases.
  - To apply and interpret the laboratory studies used for the diagnosis and monitoring of autoimmune and allergic diseases .
  - To list and understand the genetic bases and the principles of diagnosis in immunodeficiencies .
  - To identify the bases and current perspectives of the therapeutic modulation of the immune response in cancer and in organ transplantation.
  - To design, execute and interpret immunological techniques applied to biomedical research, health or industry.
  - To enumerate the pharmacological principles for the control of the immune response in the different forms of disease in which it participates.
  - To develop habits of reflection, analysis and interpretation, which allow applying the knowledge acquired in this subject to the resolution of immunologically based clinical problems.

### 4. OBJECTIVES

- To identify the cellular and molecular bases of pathogeny and treatment of autoimmune , allergic, immunodeficiencies and tumours.
- To apply and interpret the laboratory studies used in the management of immunemediated diseases.
- To identify the basis and perspectives of therapeutic modulation in organ transplantation
- To implement tools for comprehension, analysis and interpretation, that allow to apply the acquired knowledge in the degree to solve problems with immunological basis

6. SUBJECT PROGRAM	
CONTENTS	
1	<p><b>BLOCK I. INTRODUCING IMMUNOPATHOLOGY IN THE DEGREE OF BIOMEDICAL SC.</b></p> <p>Topic 1. Introduction: Presentation of the subject. Memory of the innate (IIR) and adaptive (RIA) immune responses. Global vision of the immune response (IR).</p> <p>Topic 2. Plasticity of the immune response. Update of the basic elements of IR, essential to understand Immunopathology</p>
2	<p><b>BLOCK II. INFLAMMATION AND IMMUNOPATHOLOGY</b></p> <p>Topic 3. Effector mechanisms of inflammation: biological matrix and methods to quantify them: Cellular and soluble mediators of tissue and leukocyte inflammation. Acute phase reactants.</p> <p>Topic 4. Regulation of the inflammatory response: Tissue damage and repair by the immune response. Regulation of the inflammatory response by the tissue environment. Metabolic syndrome, adipose tissue and inflammatory response.</p> <p>Topic 5. Autoinflammatory diseases: Molecular and cellular bases of autoinflammatory diseases. Diagnostic approach from the laboratory</p> <p>Topic 6. The neuro-endocrine-immune axis. Role of hormones in the regulation of the immune response to stress.</p> <p>Topic 7. Lesson 1. Fever as a clinical manifestation of inflammation. The acute phase reaction. Inflammatory and granulomatous syndromes. Sarcoidosis.</p> <p>Topic 8. Lesson 2. Autoinflammatory syndromes.</p> <p>Topic 9. Lesson 3. Clinical features of immune-mediated diseases (inflammatory arthropathies, psoriasis, IBD. Spectrum of spondyloarthropathies)</p> <p>Topic 10. Therapeutic approach in inflammatory diseases. Mechanisms of action of classic anti-inflammatories and immunosuppressants.</p>
3	<p><b>BLOCK III. THE EXCESSIVE IMMUNE RESPONSE (I.R.): HYPERSENSITIVITY AND AUTOIMMUNITY</b></p> <p>Topic 11. Clinical aspects of allergic diseases.</p> <p>Topic 12. Autoimmune organ-specific digestive diseases.</p> <p>Topic 13. Endocrine organ-specific autoimmune diseases.</p> <p>Topic 14. Systemic autoimmune diseases 1 (inflammatory arthropathies).</p> <p>Topic 15. Systemic autoimmune diseases 2 (connectivopathies).</p> <p>Topic 16. Systemic autoimmune diseases 3 (vasculitis).</p> <p>Topic 17. Role of autoantibodies in the pathogenesis of autoimmune diseases.</p> <p>Topic 18. Autoantibodies in the prediction, diagnosis and management of systemic autoimmune diseases.</p> <p>Topic 19. Autoantibodies in the prediction, diagnosis and management of organ-specific autoimmune diseases.</p> <p>Topic 20. Laboratory tests complementary to autoantibodies. Laboratory diagnostic algorithms.</p> <p>Topic 21. Total IgE and IgE against allergens in allergy management. Cellular methods of study of allergic diseases.</p>
4	<p><b>BLOCK IV. THE IR DEFECTIVE AGAINST MICROBES: IMMUNODEFICIENCIES</b></p> <p>Topic 22. IR. against microorganisms and immunodeficiencies: Reminder of the immune response against microorganisms (general information). Basic concepts of immunodeficiencies. Primary and secondary immunodeficiencies. immunosenescence. Warning signs of immunodeficiencies. Classification of primary immunodeficiencies.</p> <p>Item 23. IR to encapsulated bacteria. Associated immunodeficiencies: Production of antibodies and humoral response against extracellular bacteria. Humoral immunodeficiencies: clinical manifestations, diagnosis and approach from the laboratory.</p> <p>Topic 24. The IR to intracellular bacteria and viruses. Associated immunodeficiencies: Immune response against intracellular pathogens. Cellular and combined immunodeficiencies: clinical manifestations, diagnosis and approach from the laboratory.</p> <p>Topic 25. Consequences of a defective phagocytosis: Immune response against fungi and parasites. Phagocytic immunodeficiencies: clinical manifestations, diagnosis and approach from the laboratory.</p> <p>Topic 26. Immunodeficiencies due to defects in complement factors: Clinical manifestations, diagnosis and approach from the laboratory.</p> <p>Topic 27. Secondary immunodeficiencies. AIDS.</p> <p>Topic 28. Secondary immunodeficiencies/immunodeficiencies secondary to other infections.</p> <p>Topic 29. Secondary immunodeficiencies: Immunodeficiency associated with pharmacological immunosuppression.</p>

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BLOCK V.R.I. IN TRANSPLANTATION AND CANCER. IMMUNOTHERAPY

Topic 30. The transplantation of organs, tissues and cells. Immunological bases of transplantation. Main forms of clinical transplantation.

Topic 31. The transplantation of organs, tissues and cells. The compatibility of the HLA system and the allogeneic response. Histocompatibility laboratory in the selection of the transplant recipient.

Topic 32. The transplantation of organs, tissues and cells. Immune tolerance to transplantation. The Immunology laboratory in the monitoring of rejection and other post-transplant events.

Topic 33. Immunosuppression in transplantation: Calcineurin inhibitors and mTOR inhibitors, antiproliferatives.

Topic 34. Immunosuppression in transplantation: biological treatments. Pharmacokinetics.

Topic 35. Tumor Immunology. malignant transformation. Oncogenes and cancer induction. tumor antigens.

Topic 36. Tumor immunology. Tumors avoid the immune response, concepts of immunosurveillance and immuno-editing. Cancer immunotherapy, immunological check-points.

Topic 37. Tumor immunology. Cytokines and anti-cytokines. Anti-tumor cell therapy. Clean rooms in immunotherapy.

Topic 38. Immunotherapy. Vaccines, serum therapy, probiotics-prebiotics.

Topic 39. Immunotherapy. Substitute treatments with immunoglobulins.

Topic 40: Clinical Oncology. solid tumors. Clinical manifestations and treatments: chemotherapy, radiotherapy.

Topic 41: Clinical Oncology. Oncological tumors. Clinical manifestations and treatments: chemotherapy, CAR T cells.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written exam (30% of total mark). Theoretical part: There will be 4 partial written exams, from each of the blocks (Block I and II in the same partial) in which structure the subject, on the dates that appear in the calendar of the academic year. Each of	Written exam	No	Yes	30,00
Written exam (30% of total mark). Theoretical part: There will be 4 partial written exams, from each of the blocks (Block I and II in the same partial) in which structure the subject, on the dates that appear in the calendar of the academic year. Each of	Written exam	No	Yes	30,00
Written exam (30% of total mark). Theoretical part: There will be 4 partial written exams, from each of the blocks (Block I and II in the same partial) in which structure the subject, on the dates that appear in the calendar of the academic year. Each of	Written exam	Yes	Yes	30,00
Laboratory practical work at the end of the course	Work	No	No	10,00
TOTAL				100,00
Observations				

Theoretical part:

There will be 3 partial written exams, from each of the blocks (Block I and II in the same partial) in which structure the subject, on the dates that appear in the calendar of the academic year. Each of the partials will have a maximum value of 30% of the final grade. To pass a certain part, it is required to reach 50% of the grade maximum of each part. If the student does not pass said qualification in any of the four partial exams, he may recover it in the extraordinary call. Partial grades are kept only during the course in which these qualifications were obtained.

Structure of the partial, ordinary and extraordinary tests:

The partial exams, ordinary and the extraordinary exam may consist of different types of questions: multiple answers, questions with true/false answers, text with gaps to fill in, short answers and development questions, about the program contents. In each part, its structure will be announced in advance by the teachers responsible for teaching the corresponding subject.

In reference to the examination of the extraordinary call, each professor will communicate to the students with sufficient advance the structure of the same, which may be different from that of the partial, but always containing one of the modalities described above.

Classroom practice:

The evaluation of classroom practices will be included in the evaluation of the fourth partial exam, under the same conditions as that the theoretical contents of that block will be evaluated. Attendance and participation in this practice is mandatory. The absences from practices must be officially justified.

Laboratory practices:

The knowledge acquired in the 4 laboratory practices will be evaluated. The maximum rating may be 10% of the total course grade. In the course of each practice, students must complete a series of exercises reflected in a notebook of practices that will be used for the evaluation.

Any change of group of practices by the student must have an officially justified reason, and will be requested sufficiently in advance to the responsible teacher, so that he/she authorizes it if he/she considers the reason for the intervention to be duly justified change.

Attendance and participation in practices (classroom or laboratory) is mandatory and absences must be duly documented and justified according to regulations. Those that are not justified in this way will be penalized in the final qualification of the practice.

The third absence without justification, in the group of 6 activities, will suppose the suspension of the student in the activity and in the course. Given the impossibility of attending the practices, it is recommended to contact the responsible professor well in advance.

The evaluations of the laboratory practices are not recoverable. Repeating students will not have to repeat the laboratory practices. The grade obtained in the laboratory practice exam will be kept for courses successive, whenever the student agrees.

Final score.

To pass the subject, the total sum of grades obtained in the different tests must be equal to or greater than the 50% of the maximum possible grade. In the event that in any part the grade had been less than 50% of the maximum of that partial exam, and regardless of the total numerical sum of the qualifications, it will be considered that the student has not passed the subject, so they must recover the partial exams with rating less than 50%.

In the event that students must present themselves to the extraordinary call with the entire subject, they will not need pass a grade above 50% in each of the sections of the exam corresponding to a partial. They will have only the overall result is taken into account, regardless of the grade obtained in each section.

Adaptation in the event that the situation does not allow the teaching activity to be carried out in person: They may be used digital platforms such as Moodle to carry out an evaluation with virtual support if necessary, which will be announced in advance to the students, along with the structure of the exam. The teacher will indicate to the students if the use of any other platform for the development of the evaluation is necessary. In addition, teachers will be able to carry out an oral exam using a phone call or a video conference. The structure of such an exam will also be detailed to the students in advance.

Following the Regulation of the Evaluation Processes at the University of Cantabria, teachers will request that the student proves her identity through a video call or by sending an email. tools can be used of videoconference, which may be recorded as proof of the course of the evaluation, to monitor the evaluation. If there are problems with the use of the platform during the evaluation, the teachers will be able to carry out an oral exam is held for those students who cannot complete the assessment.

The students will receive instructions for the adaptation of the classroom practices to a format of lack of presence in the classrooms

Observations for part-time students

Part-time students must attend all compulsory practices and take the evaluation described for the rest of the internships students

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

Inmunología. Biología y patología del sistema inmunitario. 5ª Edición. Regueiro JR et al. Editorial Panamericana

The Immune System. 5th Edition. Parham

Cellular and Molecular Immunology. 10th Edition. Abul K. Abbas