



General information	
Academic subject	Immunogenomics
Degree course	<i>Bachelor's degree in Biological Sciences</i>
Academic Year	<i>Third Year</i>
European Credit Transfer and Accumulation System (ECTS)4	
Language	<i>Italian</i>
Academic calendar (starting and ending date)	Second semester (15 March-25 May 2022)
Attendance	Yes

Professor/ Lecturer	
Name and Surname	Salvatrice Maria Ciccarese
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Department and address	Room 44 on the third floor Biological Departments
Virtual headquarters	Teams
Tutoring (time and day)	Thursday 11.30-13.30

Syllabus	
Learning Objectives	To guide students to develop rigorous thinking about the scientific processes illustrated during the course leading to the formulation of experimental questions and then plan immunogenomics experiments applied to specific questions.
Course prerequisites	Prerequisites: Attendance at the courses of Genetics and Molecular Biology of the Bachelor's Degree in Biological Sciences
Contents	<p>The immune system: innate and adaptive immunity.</p> <p>Genomic organization of individual groups of genes (gene loci) of immunoglobulins and immune competent receptors</p> <p>Mechanisms that generate the variability of the proteins of the immune system: gene duplication, somatic recombination and somatic hypermutation.</p> <p>From genes to immune response proteins through allelic exclusion and somatic rearrangement. Definition of Recombinational Signal Sequences.</p> <p>Molecular model of the gene rearrangement mechanism.</p> <p>Role of the AID enzyme in gene conversion.</p> <p>The development and differentiation of B cells proceed through consecutive stages of rearrangement of the variable genes of the immunoglobulin heavy and light chains.</p> <p>Clonal selection amplifies lymphocytes that respond to individual antigens.</p> <p>T cell development and differentiation. Stages of thymocyte maturation. T lymphocyte receptors: alpha / beta and gamma / delta heterodimers.</p> <p>Genomic organization of T lymphocyte receptor loci in humans and mice.</p>



	Genome plasticity in gamma / delta T receptor loci in animal models other than humans and mice (Bovidae, Tylopoda and Cetacea). Database IMGT - THE INTERNATIONAL IMMUNOGENETICS INFORMATION SYSTEM
Books and bibliography	Gene X - Benjamin Lewin "Ricombinazione somatica e ipermutazione nel sistema immunitario" with integration of Lewin's Genes XII. All the teaching material will be provided by the teacher.
Additional materials	Some topics not present in the textbooks must eventually be integrated with scientific articles. The PowerPoint of the lessons are made available to students.

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
100	32		68
ECTS			
4			
Teaching strategy		Lectures and frontal exercises with the use of PowerPoint and the blackboard.	
Expected learning outcomes			
Knowledge and understanding on:		<ul style="list-style-type: none"> ○ Acquire the elements of basic genomics to understand the mechanisms that regulate the adaptive immune system. Acquire the ability to solve problems aimed at analyzing immunological responses. 	
Applying knowledge and understanding on:		<ul style="list-style-type: none"> ○ Ability to analyze specific biological phenomena and processes, in particular those of the immune system. Starting from basic genomics, acquire information on the processes that occur in both humans and mammals, with evolutionary implications for the adaptive immune system. 	
Soft skills		<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Acquisition of autonomy in solving immunogenomics problemsxxxxxxxx • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Acquisition of skills and adequate tools for communication through the disciplinary lexicon. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Acquisition of skills that favor the in-depth study and constant updating of immunogenomics topics through the consultation of bibliographic material. 	

Assessment and feedback	The student will have to take an oral interview.
Methods of assessment	
Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> • The student must demonstrate the ability to develop a rigorous thought with regard to scientific processes illustrated during the course • <i>Applying knowledge and understanding</i> • Formulation of hypotheses and experimental questions with the production of new knowledge in the future. • <i>Autonomy of judgment</i> • Ability to independently carry out problems aimed at genomic analysis by applying the knowledge acquired during the course



	<ul style="list-style-type: none">• <i>Communicating knowledge and understanding</i>• o Ability to discursively organize knowledge• <i>Communication skills</i>• o Competence in the use of specialized vocabulary• o Linearity in the exposure• <i>Capacities to continue learning</i><ul style="list-style-type: none">o Ability to deepen the topics related to immunogenomics through the consultation of texts and bibliographic material
Criteria for assessment and attribution of the final mark	The final grade is awarded out of thirty.
Additional information	