General information	
Academic subject	Genetic and Genomic Manipulation Techniques
Degree course	Cellular and molecular biology
Academic Year	*2021/2022*
European Credit Transfer and Accumulation System (ECTS)	4 (3+1)
Language	*Italian*
Academic calendar (starting and ending date)	*II Semester (march 7 2022 – June 17 2022)*
Attendance	*Strongly suggested*

Professor/ Lecturer	
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Department and address	Department of biology, Floor 3, Room 5
Virtual headquarters	*Microsoft Teams, channel code:* 9u0fjzw
Tutoring (time and day)	Monday and Wednesday by appointment

Syllabus	
Learning Objectives	Acquare advanced knowledgeof modern genome editing techniques
Course prerequisites	Basic knowledge of Genetics and molecular Biology
Contents	Genetic Engineering vs Genomic Editing: Definitions, History and Applications; Biological origin of the tools used in genome editing; Nucleases to "cut and paste" (Talens, ZincFinger, CRISPR); Structural modification strategies (inversions, deletions and translocations), epigenetic, knock-in, knock-out, knock down and enhancement; Use of Cas9 derivatives in Gene Therapy Alternative editing tools; Delivery strategies: Chemical methods (chemical transfectants, nanoparticles) Physical methods (Nucleofection, gene gun) and Biological methods; Evaluation of off-target potentials (NGS and Sanger); Advanced PCR techniques (HMR, Splinkerette); Evaluation of mutations generated with editing systems; Associated ethical issues
Books and bibliography	Scientific litterature
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
100	*26*	*12*	*51*
ECTS			
4	*3*	*1*	
Teaching strategy			
	Frontal lessons with multimedia supports; laboratory experiences		
Expected learning outcomes			

Knowledge and understanding on:	
Applying knowledge and understanding on:	Ability to apply appropriate techniques of genetic manipulation in order to obtain genetically modified organisms or systems for in vitro study or for therapeutic applications.
Soft skills	• *Making informed judgments and choices* • *Communicating knowledge and understanding* Acquire specific terminology in order to describe complex phenomena in a clear and concise way. • *Capacities to continue learning* Acquisition of the ability to investigate and critically read the evolution of the discipline, through the consultation of scientific reports, texts and online databases.

Assessment and feedback	
Methods of assessment	Oral Exam
Evaluation criteria	During the assessment, the student must demonstrate that they have understood the key concepts of the subject. To be able to make a careful and critical scientific review on topics similar to those used as case reports during the lessons. You must also have appropriate language skills based on concepts acquired in previous exams.
Criteria for assessment and attribution of the final mark	In addition to assessing the acquisition of notions, the student's ability to integrate them in the explanation of phenomena of interest is assessed.
Additional information	