General information	
Academic subject	MODERN PLANT BREEDING STRATEGIES
Degree course	INNOVATION DEVELOPMENT IN AGRIFOOD SYSTEMS (IDEAS)
ECTS credits	9 ECTS (6 ECTS of Lectures + 3 ECTS of laboratory or field classes)
Compulsory attendance	No
Teaching language	English

Subject teacher	Name and Last name	e-mail
	Domenica Nigro	domenica.nigro@uniba.it

ECTS credits details		
	6 ECTS Lectures	3 ECTS Laboratory or filed classes

Class schedule	
Period	1st semester
Course year	2020/2021
Type of class	Lectures and lab practices

Time management	
Hours	180
In-class study hours	90
Out-of-class study hours	90

Academic calendar	
Class begins	October 5th , 2020
Class ends	January 22nd , 2021

Syllabus	
Prerequisites/requirements	Students must have a good basic knowledge of genetics and plant biological systems.
Expected learning outcomes	***Knowledge and understanding*** o. Students will acquire the theoretical and practical basis of new breeding strategies and particularly their application to indigenous genotypes adapted to low-input cultivation systems. ***Applying knowledge and understanding*** o. The course aims to provide the knowledge necessary to apply advanced technologies for the design of new cultivars adapted to low-inputs management systems and with improved nutritional characteristics. ***Making informed judgements and choices*** o. Students will acquire the ability to critically interpret the advantages and disadvantages of the different illustrated methodologies. ***Communicating knowledge and understanding*** o. Students will acquire the ability to write and present experimental results in a clear and synthetic way.

	Capacities to continue learning o. Students will learn about modern plant breeding strategies and genetic biotechnology, how to qualify the different fields of application and apply them in the international productive context.
Contents	**Genetic resource utilization and conservation (1 ECTS)** Challenges of modern plant breeding. Origin of plant domestication and breeding. Effects on genetic variability: genetic erosion. **Breeding strategies and Molecular breeding (2 ECTS)** Overview of plant reproduction systems. Breeding strategies for autogamous, allogamous and vegetatively propagated species. Experimental mutagenesis: principles, means and results. Tilling technology and applications. MAS: marker assisted selection, technology and applications. **New Plant breeding techniques (3 ECTS)** Plant genetic transformation methods: Cisgenesis, Intragenesis and Transgenesis. Types of selectable marker genes. Use of positive selectable marker genes. Transgenic plants without markers by co-transformation. Removal of the selectable marker gene after selection of transformed plants (site-specific recombination, transposition, homologous recombination, clean gene). Genome editing: sequence-specific nuclease technology. Zinc Finger Nucleases (ZFNs), Meganucleases, TALENs and CRISPR/Cas9 Techologies. In vitro culture techniques. Examples of potential application of New plant breeding techniques. **Lab practices concerning the above reported topics (3 ECTS)**.

Course program	
Reference books	• Genetics and Plant Breeding, Roderick Wiley &, Scientific e-Resources, 2019, 1839472715,

	9781839472718 • Advanced Molecular Plant Breeding: Meeting the Challenge of Food Security, D.N. Bharadwaj, CRC Press, 2018, ISBN: 1351358472, 9781351358477 • Lecture notes • Bibliographic material: Scientific papers in international journals
Notes	
Teaching methods	Lectures with multimedia support, laboratory practices.
Evaluation methods	Oral examination
Evaluation criteria	***Knowledge and understanding*** o Students must demonstrate full mastery in identifying and applying the most appropriate genetic improvement methods and genetic biotechnologies, among those examined, to respond to different biotechnological questions. ***Applying knowledge and understanding*** o. Students must demonstrate their ability to operate in the laboratory respecting the main safety standards. ***Making informed judgements and choices*** o. Students must demonstrate their ability to critically evaluate the limiting factors of each analyzed experimental procedures. ***Communicating knowledge and understanding*** o. Students must demonstrate clarity and completeness in the oral presentation of the program contents and in the drafting of power point presentations. ***Capacities to continue learning*** o. Students must demonstrate their ability to link with the contents of other courses
Receiving times	Define the appointment by e-mail.