

General information	
Academic subject	MODERN PLANT BREEDING STRATEGIES
Degree course	INNOVATION DEVELOPMENT IN AGRI-FOOD 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 field classes

Class schedule	
Period	I <sup>st</sup> semester
Course year	2021/2022
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 18 <sup>th</sup> , 2021
Class ends	January 28 <sup>th</sup> , 2022

Syllabus	
Prerequisites/requirements	Students must have a good basic knowledge of genetics and plant biological systems.
Expected learning outcomes	<p><b>Knowledge and understanding</b></p> <p>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.</p> <p><b>Applying knowledge and understanding</b></p> <p>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.</p> <p><b>Making informed judgements and choices</b></p> <p>o. Students will acquire the ability to critically interpret the advantages and disadvantages of the different illustrated methodologies.</p> <p><b>Communicating knowledge and understanding</b></p> <p>o. Students will acquire the ability to write and present experimental results in a clear and synthetic way.</p> <p><b>Capacities to continue learning</b></p>

	<p>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.</p>
<p>Contents</p>	<p><b>Genetic resource utilization and conservation (1 ECTS)</b></p> <p>Challenges of modern plant breeding. Origin of plant domestication and breeding. Effects on genetic variability: genetic erosion.</p> <p><b>Breeding strategies and Molecular breeding (2 ECTS)</b></p> <p>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.</p> <p><b>New Plant breeding techniques (3 ECTS)</b></p> <p>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 Technologies. In vitro culture techniques. Examples of potential application of New plant breeding techniques.</p> <p><b>Lab practices concerning the above reported topics (3 ECTS).</b></p>

<p><b>Course program</b></p>	
<p>Reference books</p>	<ul style="list-style-type: none"> <li>• Genetics and Plant Breeding, Roderick Wiley &amp; Scientific e-Resources, 2019, 1839472715, 9781839472718</li> </ul>

	<ul style="list-style-type: none"> <li>• Advanced Molecular Plant Breeding: Meeting the Challenge of Food Security, D.N. Bharadwaj, CRC Press, 2018, ISBN: 1351358472, 9781351358477</li> <li>• Lecture notes</li> <li>• Bibliographic material: Scientific papers in international journals</li> </ul>
Notes	
Teaching methods	Lectures with multimedia support, laboratory practices.
Evaluation methods	Oral examination
Evaluation criteria	<p><b>Knowledge and understanding</b></p> <p>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.</p> <p><b>Applying knowledge and understanding</b></p> <p>o. Students must demonstrate their ability to operate in the laboratory respecting the main safety standards.</p> <p><b>Making informed judgements and choices</b></p> <p>o. Students must demonstrate their ability to critically evaluate the limiting factors of each analyzed experimental procedures.</p> <p><b>Communicating knowledge and understanding</b></p> <p>o. Students must demonstrate clarity and completeness in the oral presentation of the program contents and in the drafting of power point presentations.</p> <p><b>Capacities to continue learning</b></p> <p>o. Students must demonstrate their ability to link with the contents of other courses</p>
Receiving times	Define the appointment by e-mail.