UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DiSSPA - DIPARTIMENTO DI SCIENZE DEL SUOLO, DELLA PIANTA E DEGLI ALIMENTI

MUR DIPARTIMENTO DI ECCELLENZA 2023-2027

COURSE OF STUDY *Degree in Sustainable Agriculture Techniques (LP-02)*
ACADEMIC YEAR *2024/2025*
ACADEMIC SUBJECT *Genetics and plant breeding– 4 ECTS*

General information	
Academic subject	**Genetics and plant breeding**
Degree course	Degree in Sustainable Agriculture Techniques (LP-02)
Academic Year	First
European Credit Transfer and Accumulation System (ECTS)	4
Language	Italian
Academic calendar (starting and ending date)	I semester
Attendance	No compulsory

Professor/ Lecturer	
Name and Surname	**Agata Gadaleta**
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Telephone	+39 0805442995
Department and address	DiSSPA Section of Genetic and Plant breeding
Virtual headquarters	Microsoft Teams Class
Tutoring (time and day)	Monday-Friday (9.00-12.30) by appointment. Tutoring is also provided through Microsoft Teams.

Syllabus	
Learning Objectives	At the end of the course the students will acquire the basic knowledge on the main approaches to the study of genetics and the main methodologies for plant breeding.
Course prerequisites	
Contents	**STRUCTURE AND FUNCTION OF GENE MATERIAL. DNA and RNA.** DNA organization in chromosomes. DNA replication. The classical theory of the gene. Organization and transmission of hereditary material (chromosomes, karyotype, references to mitosis, meiosis, life cycles). Transcription process: the expression of the gene. RNA molecules. Nature of the genetic code. Translation of the genetic message. **MENDELIAN INHERITANCE.** Mendel's experiments and principles. Self-fertilization and backcrossing. Reduction of heterozygosity and implications for breeding. Multiple allelism and incompatibility in plant species. Intra and interallelic interactions. Gene association. Crossing over and gene recombination. **QUANTITATIVE GENETICS** and population. Qualitative and quantitative characteristics. Genetic basis of continuous variability. The concept of heritability **GENETIC IMPROVEMENT** Notes on the variability in natural populations of plant species. Mainly autogamous, allogamous plants. Notes on the main methods of genetic

	improvement; Varietal constitutions, inbreeding and heterosis
Books and bibliography	– LORENZETTI F., CECCARELLI S., ROSELLINI D., VERONESI F. 2011. Genetica agraria. Patron Ed. – LORENZETTI F., M. FALCINELLI, F. VERONESI, 1994. Miglioramento genetico delle piante agrarie. Edagricole, Bologna
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
100	16	14 hours classroom exercises +28 (14 x2) Laboratory exercise where students will be divided into two groups)	42
ECTS			
4	2	2	

Teaching strategy	The teaching activity, divided into theoretical lessons and classroom exercises, represents the main teaching method. The theoretical lessons are supplemented by the illustration of practical examples. The exercises are based on the execution guided by the teacher of exercises which facilitate the understanding of the theoretical concepts and laboratory activities. The topics of the course are covered with the help of Power Point presentations.
Expected learning outcomes	
Knowledge and understanding on:	○ Knowledge of the basics of genetics and breeding. ○ Knowledge of the basic notions of agricultural genetics and population genetics. ○ Knowledge of the principles of genetic improvement
Applying knowledge and understanding on:	○ Knowledge and understanding of the main tools for the management of the genetic materials ○ Application of methodologies for the plant genetic, the creation of genetic variation and plant breeding.
Soft skills	• ***Making informed judgments and choices*** ○ Ability to evaluate, through a critical approach, the relevant aspects of genetics and varieties. ○ Capacity to understand suitable tools for the management of genetics and plant breeding. • ***Communicating knowledge and understanding*** ○ Development of personal skill of communication, multidisciplinary group work and judging capacity • ***Capacities to continue learning*** ○ Ability to deepen and update knowledge of the genetic evolution of new cultivars. ○ Ability to deepen and update knowledge of agricultural genetics tools ○ Ability to learn the emerging problems in the management of the genetic materials.

Assessment and feedback	
Methods of assessment	For students enrolled in the year in which the lectures are given there will be a

	midterm test. This midterm test is carried out in oral form on the topics developed during the lectures. The evaluation is awarded in thirtieths and the achievement of a minimum mark of 18/30 is needed. The mark of the midterm test contributes to the final mark, but only within one academic year. The final exam consists of an oral test on the topics developed during the lectures, both theoretical and practical, with the aim to verify the acquired knowledge and the ability to face practical issues. The evaluation of the student's preparation is done based on established criteria, as detailed in Annex A of the Teaching Regulations of the Degree Programme in Sustainable Agriculture Techniques (TAS). The evaluation of the Foreign students' preparation can be made by written test.
Evaluation criteria	• ***Knowledge and understanding*** o Capacity to correctly report themes related to population genetics, conservation genetics and plant breeding. o Knowledge and understanding of the theoretical aspects for the creation of new genotypes. o Knowledge of the main features related to genetic materials in the agri-food system. • ***Applying knowledge and understanding*** o Capacity to correctly report methodologies for valorisation of genetic resources and plant breeding • ***Autonomy of judgment*** o Ability to evaluate, through a critical approach, the relevant aspects of genetics and plant breeding. o Capacity to evaluate most suitable strategies in the genetics for the valorisation of genetic resource. • ***Communicating knowledge and understanding*** o Capacity to communicate knowledge acquired during the course • ***Capacities to continue learning*** o Capacity to update knowledge on themes treated during the course.
Criteria for assessment and attribution of the final mark	The assessment of the student's preparation is based on predetermined criteria in accordance with the Didactic Regulations of the Degree Programme in Sustainable Agriculture Techniques (TAS). The Examination Committee has a score ranging from a minimum of 18 to a maximum of 30 points for a positive assessment of the student's performance. By unanimous vote of its members, the Board may award honours in cases where the final mark is 30.
Additional information	