COURSE OF STUDY *Bachelor degree: Food Science and Technology (L26)*

ACADEMIC YEAR *2023-2024*

ACADEMIC SUBJECT *Principles of genetics (3 ECTS) - I.C. Principles of plant physiology and genetics (6 ECTS)*

General information	
Year of the course	*First*
Academic calendar (starting and ending date)	*Second semester (March 4th – June 14th, 2024)*
Credits (CFU/ECTS):	3
SSD	*Agricultural genetics (AGR/07)*
Language	*Italian*
Mode of attendance	*No Compulsory*

Professor/ Lecturer	
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Department and address	*DIP. DISSPA – Università degli Studi di Bari*
Virtual room	*Microsoft Teams: code o2s9c7u*
Office Hours (and modalities: e.g., by appointment, on line, etc.)	*Monday to Friday by appointment only.*

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
75	16	14	45
CFU/ETCS			
3	*2*	*1*	

Learning Objectives	The course aims to provide knowledge on the replication of genetic information and its expression, the issues related to the segregation of genes and genetic association and the main causes of modification of hereditary material.
Course prerequisites	Knowledge of inorganic and organic chemistry and biology

Teaching strategies	Lectures will be held with the help of powerpoint presentations. Lecture notes and educational supplies will be provided by e-mail or online platforms.
Expected learning outcomes in terms of	
Knowledge and understanding on:	● Knowledge on the principal genetic methodologies
Applying knowledge and understanding on:	● Applying and understanding the principal genetic methodologies for crop and food production

	● Ability to trace the genetic phenomena that determine the characteristics and quality of plant products. ● Ability to describe genetic characteristics and structural organization of genetic material
Soft skills	● Making informed judgments and choices: ○ Ability to correctly orient the use of genetic tools to the food chain. ○ Ability to correctly orient the search for suitable genetic means to monitor the characteristics of plant products. ● Communicating knowledge and understanding: ○ Capacity to identify the principal genetic methodologies for crop and food production. ● Capacities to continue learning: ● Capacity to communicate and continue learning the principal genetic methodologies for crop and food production.
Syllabus	
Content knowledge	● BASIC CONCEPTS OF GENETICS. Evidence of DNA as hereditary material. Genotype and phenotype. Genetic and environmental variation. The main factors of genetic variation. GENE STRUCTURE AND FUNCTION OF DNA AND RNA. ● DNA and RNA structure. Replication of DNA. Transcription and translation. Nature of the genetic code. ● ORGANIZATION AND TRANSMISSION OF HEREDITARY MATERIAL. Organization of DNA in the chromosomes. Chromosomes. Karyotype, Mitosis. Meiosis. Life cycles. ● MENDEL'S HEREDITY. Mendel's experiments and principles. Selfing and backcrossing. Heterozigosity reduction and implications for breeding. Statistical analysis of gene segregation. The chromosomal theory of heredity. Interallelic interactions. Epistatic genes. Complementary genes. Multiple alleles and incompatibility in plant species. Characters associated with sex. Association of genes. Crossing over and gene recombination. Genetic maps. ● MUTATIONS. Types and origin of mutations. Gene mutations. Chromosomal mutations. Aneuploids. Polyploids.
Texts and readings	● Snustad D.P., Simmons M.J. 2006. Principles of Genetics. Wiley Publisher. ● Russel P.J. 2006. IGenetics: A Molecular Approach. Pearson/Benjamin Cummings Publisher • Notes from classes
Notes, additional materials	● Griffiths A.J. F., Gelbart W. M., Miller J. H., Lewontin R. C. 2004. Genetica moderna. Zanichelli, Vol. I-II. ● Chrispeels M. J., Sadava D. E. 2005. Genetica, Biotecnologie e agricoltura sostenibile. Idelson-Gnocchi. ● Examples and case study discussions.
Repository	All teaching material will be available to students on web platforms (class Teams code *o2s9c7u*).

Assessment	

Assessment methods	The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in practical activities (laboratory and educational visits). Students may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for one academic year (Art. 4 of the Didactic Regulations of the Bachelor's Degree Course in Food Science and Technology). The result of the mid-term exam is communicated by publication in the student's electronic register and contributes to the assessment of the profit examination by means of calculation of the weighted average. The exam for foreign students may be conducted in English as described above.
Assessment criteria	● Knowledge and understanding: ○ Knowledge on the principal genetic methodologies. ● Applying knowledge and understanding: ○ Applying and understanding the principal genetic methodologies for crop and food production. ● Autonomy of judgment: ○ Ability to apply the basic principles of genetics and trace genetic phenomena that determine the characteristics and quality of plant products. ● Communicating knowledge and understanding: ○ Capacity to identify and discuss the principal genetic methodologies for crop and food production. ● Communication skills: ○ Communicating the theoretical acquired concepts using the appropriate scientific language and the specific lexicon of genetics. ● Capacities to continue learning: ○ Capacity of communicate and continue learning the principal genetic methodologies for crop and food production.
Final exam and grading criteria	The assessment of the student's preparation is based on predetermined criteria in accordance with the Didactic Regulations of the Bachelor's Degree Course in Food Science and Technology (art. 4). 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.
Further information	