General Information	
Academic subject	Bachelor degree
Degree course	Agricultural Genetics
Curriculum	Agricultural and Technologies Sciences
ECTS credits	6
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Luigi Ricciardi	luigi.ricciardi@uniba.it	AGR07

ECTS credits details			
Basic teaching activities			

Class schedule	
Period	II semester
Year	2020-21
Type of class	Lecture- workshops and laboratory

Time management	
Hours	150
In-class study hours	60
Out-of-class study hours	90

Academic calendar	
Class begins	01/03/2021
Class ends	11/06/2021

Syllabus	
Prerequisites/requirements	
Expected learning outcomes	*Knowledge and understanding* Knowledge on : 1. Structure and function of nucleic acids 2. Mendelian hereditability; 3. Gene association 4. DNA replication, transcription and translation 5. Quantitative and population genetics *Applying knowledge and understanding* The student to apply have to be able to understand heredity of the most interesting bio-agronomical traits *Making informed judgements and choices* The student have to be able to perform genetic analysis to understand heredity of the most interesting bio-agronomical traits *Communicating knowledge and understanding* The student will spur communications by means of interaction with teacher and of oral and written exam *Capacities to continue learning* It will be evaluate by means of discussions during the lecture among teacher and students

Contents	Heredity and variability, Mendelian inheritance, Genetic linkage and mapping in eukaryotes, Structure and function of genes, Transcription and translation of genetic information, Recombinant DNA and agriculture, Gene mutations, Genetics of population, Quantitative genetics, Applications of genetics
Course program	• **Heredity and variability**. Genotype and phenotype. **DNA**, genes, organism and environment. Causes of genetic variation. Reproduction and transmission of characters (chromosomes, cariotype, genetic aspects of mitosis and meiosis, life cycles). The role of inter- and intra-species crosses in genetics and agriculture. • **Mendelian inheritance.** Mendel's experiments and principles. Selfing and backcrossing. Heterozygosity reduction and consequences for breeding. Statistical analyses of gene segregation: the test. Chromosome theory of heredity. Sex linked characters. Multiple alleles and plant incompatibility. Interactions between alleles and between genes. Environment and gene expression. Elements of non-mendelian inheritance: extranuclear inheritance • **Genetic linkage and mapping in eukaryotes.** Gene linkage. Crossing over and recombination. Testing for linkage among two or three genes. Genetic maps. • **Structure and function of genes**. DNA and RNA. Chromosome organisation. DNA replication. Gene-trait relationships. Classic theory of gene function. • **Transcription and translation of genetic information** • The process of transcription and gene expression. RNA molecules and processing. Elongation and termination of RNA transcripts. The characteristics of the genetic code. Translation of genetic information. • **Recombinant DNA and agriculture**. Restriction enzymes. Cloning vectors and DNA cloning. Gene libraries. Clone identification. Polymerase Chain Reaction (PCR). Identification of DNA polymorphism and applications. Genetic transformation and approaches to gene transfer. • **Gene mutations**. Types and origins of mutations. Gene mutations, chromosome mutations, genome mutations. Auto- and allo-polyploidy. • **Genetics of population**. Natural variation in autogamous and allogamous plant species and in animals. Hardy-Weinberg equilibrium. Elements of: changes from Hardy-Weinberg equilibrium, inbreeding depression, heterosis. • **Quantitative genetics**. Qualitative vs quantitative traits. Genetic causes of continuous variation. The rationale for the analysis of continuous variation. The concept of heritability. • **Applications of genetics**. Genetics and plant and animal breeding. The concept of cultivated variety. Categories of cultivar types in autogamous and

	allogamous crops.
Bibliography	RUSSEL P.J., 2010. Genetica. Un approccio molecolare (terza edizione), Pearson Italia – Milano,Torino. RUSSELL P.J., 2004. iGenetica Fondamenti. EdiSES, Napoli. RUSSELL P.J., 1997. Fondamenti di genetica. EdiSES, Napoli. LORENZETTI F., S. CECCARELLI, D. ROSSELLINI, F. VERONESI, 2011. Genetica agraria. Genetica e biotecnologie per l'agricoltura (quarta edizione), Pàtron Editore, Bologna. BARCACCIA G., FALCINELLI M., 2005. Genetica e genomica. Vol. I: "Genetica generale". Liguori Editore, Napoli. SANDERS M.K., BOWMAN J.L., 2013. Genetica. Un approccio integrato. Pearson Italia – Milano, Torino GRIFFITH A.J.F., W.M.GELBART, J.H. MILLER, R.C. LEWONTIN, 2000. Genetica moderna. Zanichelli, Bologna.
Notes	
Teaching methods	Power point
Assessment methods	The exam consists of an intermediate written test and a final oral test or only of a final oral test with questions related to the programme, discussion sessions, exercises. The professor might ask to solve in written form a genetic quiz on Mendelian inheritance prior to the oral exam.
Evaluation criteria	*Knowledge and understanding* The student have to be able to reach a sufficient knowledge on: 1) heredity; 2) DNA replication, transcription and translation; 3) gene association; 4) quantitative and population genetics *Applying knowledge and understanding* The student have to be able to understand topics acquired during classes *Making informed judgements and choices* The student have to be able to speculate the mechanism of genetic control of the most important bio-agronomic traits *Communicating knowledge and understanding* The student have to be able to explain topics acquired during classes
Further information	