General Information	
Academic subject	**Plant breeding (Module of Plant Breeding of agricultural crops)**
Degree course	**Master Course in Plant Medicine (LM69)**
Curriculum	
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	Disciplines of plant breeding		

Class schedule	
Period	First semester
Year	Second year
Type of class	Lectures, 4 ECTS (32 hours) Laboratory and field classroom and workshops, 2 ECTS (28 hours)

Time management	
Hours	150
In-class study hours	60 (32 Lectures + 28 Lab & field cl.)
Out-of-class study hours	90

Academic calendar	
Class begins	October 2, 2017
Class ends	January 26, 2018

Syllabus	
Prerequisites/requirements	

Expected learning outcomes	• *Knowledge and understanding*
	  ○ Teaching will provide knowledge on: 1) reproduction systems of plant; 2) genetic structures of autogamous, allogamous and vegetative propagation crops; 3) plant breeding methods; quantitative genetics.
	• *Applying knowledge and understanding*
	  ○ Teaching allows the student to apply traditional and innovative techniques for the safeguard of genetic resources and their use in plant breeding
	• *Making informed judgements and choices*
	  ○ The student will be able to speculate the mechanism of hereditability and to set up plant breeding plans.
	• *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	**PLANT BREEDING AND USE OF GENETIC VARIATION** **Introduction.** Definitions and aims of plant breeding. Introduction and domestication of cultivated species. The ideotype in relation to natural environments and markets. **Reproductive systems in cultivated species.** Some morpho-physiological and genetic mechanisms related to reproductive

	system. Self-incompatibility and male sterility. Relationships between reproductive systems and plant breeding methods. Assessment of cross-pollination rate. **The plant genetic resources**. Origin and evolution of plant genetic resources. The centres of plant genetic diversity. Safeguard, collecting and conservation of germplasm. Entry definition. **POPULATION GENETICS** **Genetic systems and population structure of autogamous species**. Inbreeding e outbreeding. Selfing and selection. Johanssen's experiments. Sources of genetic variation in self-pollinated species. **Genetic systems and population structure of allogamous species**. Sources of genetic variation in cross-pollinated species. Hardy-Weinberg law. Factors of gene frequency change. Assessment of the inbreeding coefficient. Effect of inbreeding on Hardy-Weinberg equilibrium and quantitative traits. Inbreeding depression and heterosis. **Genetic systems and population structure of vegetatively propagated species**. Sources of genetic variation and germplasm. The definition of clone. **QUANTITATIVE GENETICS** **Genetic analysis for quantitative traits.** Definition of qualitative and quantitative traits. Polygenic theory. Phenotypic and genotypic values. Additivity, dominance and interallelic intractions in the quantitative inheritance. Broad and narrow heritability. Some examples of cross designs. **The selection**. Selection for qualitative and quantitative traits. The differential of selection and the genetic gain. Experiment of selection. Marker assisted selection. **Plant breeding for self-pollinated species.** The mass selection and pure line methods. Pedigree, mass-pedigree, bulk-population and single-seed-descent methods. Backcross method and doubled haploids. Examples of self-pollinated varieties. **Plant breeding for cross-pollinated species.** The progeny test. General and specific combining ability. Set-up of inbred lines. Mass selection. Half and full-sib selection. Reciprocal recurrent selection method. Backcross. Examples of cross-pollinated varieties. Landraces. Male sterility in hybrid varieties setting-up. Hybrid and synthetic varieties. **Plant breeding for vegetative propagated species**. Self-and out-crossing selection. Clonal selection. Methods to increase genetic variation. Early selection methods. Mono and poly-clonal varieties. **SOURCES OF VARIATION AND THEIR APPLICATION IN PLANT BREEDING** **Definitions and examples.** Interspecific and inter-generic hybridization. The polyploidy. The experimental mutagenesis. *In vitro* culture. The bio-engineering tools. **THE REGULATIONS FOR THE SET-UP OF NEW VARIETIES** **General rules for certificate seed production.** Set-up and registration of self and cross pollinated crops in national and U.E. lists. Plant breeder's rights. Seed trading.
Course program	
Bibliography	• SCARASCIA MUGNOZZA G.T. (Coord.), 1988. Miglioramento genetico vegetale, Patron Editore, Bologna. • LORENZETTI F., M. FALCINELLI, F. VERONESI, 1994. Miglioramento genetico delle piante agrarie. Edagricole, Bologna. • LORENZETTI F., S. CECCARELLI, F. VERONESI, 1996.

	Genetica Agraria. Patron Editore, Bologna. • BARCACCIA G., FALCINELLI M., 2005. Genetica e genomica. Vol. II: "Miglioramento genetico". Liguori Editore, Napoli. • Notes of the lectures distributed during the course. • Solved exercises and overheads available in the DiBCA library
Notes	
Teaching methods	Lectures will be presented through PC assisted tools (Powerpoint, Adobe Acrobat, etc.), slide projector, overheads. Various materials might be shown to elucidate theoretical aspects ("*in vitro*" and "*in vivo*" specimens, tools, etc.)
Assessment methods	*For students enrolled in the course year in which the teaching is done there will be an intermediate test. This test is done by carrying out an oral exam The final exam takes place on the remaining parts of the program not included in the intermediate test, and it lasts for one year. For students who do not support the intermediate test, the exam consists of an oral exam on the topics covered both during lectures and lab, field and greenhouse training.* *The final examination mark will be in thirtieth.*
Evaluation criteria	• *Knowledge and understanding* o The student have to be able to reach a sufficient knowledge on: 1) reproduction systems of plant; 2) genetic structures of autogamous, allogamous and vegetative propagation crops; 3) plant breeding methods; quantitative genetics. • *Applying knowledge and understanding* o The student have to be able to apply traditional and innovative techniques for the safeguard of genetic resources and their use in plant breeding • *Making informed judgements and choices* o The student have to be able to speculate the mechanism of hereditability and to set up plant breeding plans. • *Communicating knowledge and understanding* o The student have to be able to explain topics acquired during classes.
Further information	**Visiting hours** Monday, Tuesday and Wednesday, from 10.30 to 13.30.