



COURSE DETAILS

"PLANT BREEDING"

SSD AGR/07

DEGREE PROGRAMME: SCIENZE E TECNOLOGIE AGRARIE

ACADEMIC YEAR 2021-2022

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: AMALIA BARONE

PHONE: 0812539491

EMAIL: AMBARONE@UNINA.IT

GENERAL INFORMATION ABOUT THE COURSE

YEAR OF THE DEGREE PROGRAMME: I

SEMESTER: I

CFU: 8

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE “ORDINAMENTO”)

PREREQUISITES (IF APPLICABLE)

Knowledge of Plant Genetics, Botany and Agronomy

LEARNING GOALS

The aim of the course is to provide the student with in-depth notions of tools and strategies to improve plants of agricultural interest, with the final aim of integrating his/her previous knowledge of plant genetics, botany agronomy, plant defense, to obtain new cultivated varieties with added economic value.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student needs to show ability to know and understand the problems related to plant genetics and breeding realized through traditional and innovative technologies. He/she must show the ability to discuss and find the best strategies to obtain new improved varieties of species with autogamous, allogamous and vegetative reproduction systems.

Applying knowledge and understanding

The student must demonstrate his/her ability to design the ideotype to be achieved through plant breeding approaches, therefore to choose the best strategies to increase the genetic variability and to apply the most suitable selection methods, depending on the reproductive system of the species under study. He/she must also be able to orient his/her choices according to the laboratory techniques related to in vitro culture, genetic transformation and the use of molecular markers.

COURSE CONTENT/SYLLABUS

- 1- Course description and examination criteria
- 2- Angiosperm reproduction -1 CFU (The meiotic process with its genetic consequences; microsporogenesis and microgametogenesis; macrosporogenesis and megagametogenesis; double fertilization; reproductive methods in autogamous, allogamous and vegetative propagation plants; genetic structure of autogamous, allogamous and vegetative propagation populations).
- 3- Plant reproduction mechanisms – 1 CFU (Male-sterility, self-incompatibility, apomixis).
- 4- Genetics of quantitative traits -1 CFU (Statistical parameters to study the genetic variability of quantitative traits; the heritability; Genetic variance composition; randomization of experimental plans; ANOVA statistical analysis).
- 5- Exploiting plant genetic variability – 1 CFU (Plant Genetic Resources; interspecific hybridization; molecular markers to estimate the genetic variability).
- 6- Methods to increase the genetic variability - 2 CFU (In vitro culture and somatic hybridization, somaclonal variation, genomic manipulations, polyploidization and haploidization, genetic transformation).
- 7- Methods of selection – 1 CFU (Selection of Mendelian and quantitative traits, selection gain. Methods of selection for autogamous, allogamous and vegetative propagation plants, marker assisted-selection).
- 8- Classical and innovative strategies of breeding – 1 CFU (Breeding for biotic and abiotic stress response, quality of food product).

READINGS/BIBLIOGRAPHY

- *Genetica e genomica Volume II*, G. Barcaccia e M. Falcinelli, Liguori ed.
- *Miglioramento genetico delle piante agrarie*, Lorenzetti et al., 2018, Edagricole.

- *Genetica Agraria-Genetica e biotecnologie applicate all'agricoltura*, F. Lorenzetti, S. Ceccarelli, D. Rossellini, F. Veronesi, Patron ed.
- *Genetica e genomica Volume III*, G. Barcaccia e M. Falcinelli, Liguori ed

TEACHING METHODS

The teacher will use: 1) lectures for about 60% of the total hours; 2) exercises in classroom to verify the issues related to reproductive systems and quantitative genetics, for about 20% of the total hours; 3) laboratory training to deepen the theoretical knowledge related to the use of in vitro culture and molecular markers techniques, for about 20% of the total hours.

EXAMINATION/EVALUATION CRITERIA

a) Exam type:

| Exam type | |
|--------------------|---|
| written and oral | |
| only written | |
| only oral | X |
| project discussion | |
| other | |

| | | |
|--|-------------------------|--|
| In case of a written exam, questions refer to: (*) | Multiple choice answers | |
| | Open answers | |
| | Numerical exercises | |

(*) multiple options are possible