



No. _____ of _____

USAMV form 0102040114

SUBJECT OUTLINE**1. Information on the programme**

1.1. Higher education institution	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca
1.2. Faculty	Agriculture
1.3. Department	II - Crop science
1.4. Field of study	Agriculture
1.5. Cycle of study ¹	Bachelor of Science
1.6. Specialization/ Study programme	Montanology
1.7. Form of education	Full time

2. Information on the discipline

2.1. Discipline name		Plant breeding						
2.2. Course coordinator				Associate prof. dr. Leon MUNTEAN				
2.3. Seminar/ laboratory/ project coordinator				Assistant prof. dr. Andreea ONA				
2.4. Year of study	IV	2.5. Semester	I	2.6. Evaluation type	Summative	2.7. Discipline status	Content ²	DD
							Compulsoriness ³	DI

3. Total estimated time (teaching hours per semester)

3.1. Hours per week - full time programme	4	out of which: 3.2. lecture	2	3.3. seminar/ laboratory/ project	2
3.4. Total number of hours in the curriculum	56	out of which: 3.5. lecture	28	3.6. seminar/laboratory	28
Distribution of the time allotted					hours
3.4.1. Study based on books, textbooks, bibliography and notes					25
3.4.2. Additional documentation in the library, electronic platforms and field experiences					15
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					20
3.4.4. Tutorials					-
3.4.5. Examinations					9
3.4.6. Other activities					-
3.7. Total hours of individual study	69				
3.8. Total hours per semester	125				
3.9. Number of credits ⁴	5				

4. Prerequisites (if applicable)

4.1. curriculum-related	Genetics, Botany, Experimental Design, Crop Science, Physiology, Biochemistry
4.2. skills-related	The student must possess knowledge of the main crops biology, molecular and population genetics and field trial experiments

5. Conditions (if applicable)

5.1. for the course	The course is presented in PowerPoint format, including pictures and diagrams to facilitate understanding of the content. It is interactive, students asking questions throughout the course, and answering questions to assess message sent feedback. The course proceeds as scheduled, respecting the start time and end time of its.
5.2. for the seminar/ laboratory/ project	Practical work is conducted in the laboratory and on educational trips. During lab work, theoretical issues are introduced to the students and practical work guides, teaching and biological material are made available to them for further study. Educational trips aimed participation in certain stages of plant breeding process and interaction with breeders. Academic discipline and seriousness required throughout the duration of works.

6. Cumulated specific competences

Professional competences	<ul style="list-style-type: none"> - To know the specific terminology of plant genetics and plant breeding. - To know the plant genetic resources and their role in the development of the crop plant, its use in plant breeding. - To acquire the methodology of creating genotypic variability and its use in the creation of cultivars, hybrids and clones. - To acquire specific knowledge regarding biotechnology used in breeding programs - To know generalities about the types of cultivars and how to improve their seed production.
Transversal competences	<ul style="list-style-type: none"> - To be able to develop a program for the collection, study, maintenance and use of plant genetic resources. - To be able to create field trials of new genotypes (varieties, hybrids, clones). - To be able to organize seed producing farms of corn, sunflower, sugar beet.

7. Discipline objectives (based on the cumulated specific competences)

7.1. General objective	It aims to deepen conventional and unconventional methodologies work to increase the efficiency of creating new valuable genotypes and preserve their purity and their genetic potential in seed producing process.
7.2. Specific objectives	<ul style="list-style-type: none"> - To understand the need of maintaining the germplasm diversity. - To know how to multiply cultivars in order to maintain their purity. - Familiarity with the biotechnological methods used in plant breeding.

8. Content

8.1. COURSE Number of hours - 28	Teaching methods	Observation
1. Introduction to plant breeding: definition, purpose, importance and relationship with other disciplines.	Lectures	1 lecture
2. Reproduction and multiplication in plants: types of reproduction and the use of features biological of reproductive systems in plant breeding.	Lectures	1 lecture
3. Plant genetic resources: evolution and genetic diversity, domestication of cultivated species, vulnerability and genetic erosion and conservation of plant genetic resources	Lectures	1 lecture
4. Variability and heredity: sources of genetic variability, heredity, inheritance of quantitative and qualitative features	Lectures	1 lecture
5. Genetic recombination: type of hybridization, hybridization stages and the genetic basis of hybridization.	Lectures	1 lecture
6. Inbreeding and heterosis in plant breeding.	Lectures	2 lectures
7. Using the chromosomes number variation in plant breeding.	Lectures	1 lecture
8. Mutations in plant breeding.	Lectures	2 lecture
9. The use of biotechnology in plant breeding.	Lectures	1 lecture
10. Breeding of self-pollinated crops.	Lectures	1 lecture
11. Breeding cross-pollinated species.	Lectures	2 lecture
12. Breeding vegetative propagated species	Lectures	1 lecture

8.2. PRACTICAL WORKS Number of hours - 28	Teaching methods	Observation
1. The main stages of breeding process and their characterization.	Poster with main stages of breeding process	1 laboratory work
2. Activities in the plant breeding field.	Visit the SCDA Turda	1 laboratory work
3. Individual selection in self-pollinating plants. Extracting wheat elite.	Selection scheme, ears of weath, rulers, calculators and analytical balances	1 laboratory work
4. Individual selection in cross-pollinating plants. Extracting elite maize.	Selection scheme, corn cobs, rulers, calculators and analytical balances	1 laboratory work
5. Mass selection.	Mass selection schemes	1 laboratory work
6. Inbreeding and hybridization technique.	Maize plants, inflorescence of wheat, barley and beans	1 laboratory work
7. Improving the sexual hybridization and selection.	Pedigree method, population method, successive cycles method schemes	1 laboratory work
8. Backcross method.	Selection scheme	1 laboratory work
9. Plant breeding by hybridization and clonal selection.	Selection scheme	1 laboratory work
10. Plant breeding by inbreeding and heterosis.	Selection scheme	1 laboratory work

11. Recurrent selection.	Selection schemes	1 laboratory work
12. Methods used for testing plant resistance to pests and diseases.	Diseased plants of wheat, corn, beans and sunflower	1 laboratory work
13. Methods used for testing plant resistance to climatic stress.		2 laboratory works
Compulsory bibliography:		
1. MUNTEAN L., 2019-2020 – <i>Notițe de curs</i>		
2. MUNTEAN L., 2012, <i>Ameliorarea plantelor – partea generală</i> , Ed. AcademicPres, Cluj-Napoca		
3. HAȘ I., 2006, <i>Producerea semințelor la plantele agricole</i> , Ed. AcademicPres, Cluj-Napoca		
4. SAVATTI M., M. SAVATTI jr., L. MUNTEAN, 2003 – <i>Ameliorarea plantelor – teorie și practică</i> , Ed. AcademicPres, Cluj-Napoca		
Optional bibliography:		
1. SAVATTI M., G. NEDELEA, M. ARDELEAN, 2004, <i>Tratat de ameliorarea plantelor</i> , Ed. Marineasa, Timișoara		
2. *** <i>Reviste "Cercetări de genetică teoretică și aplicată" ICCPT Fundulea -1971-2008</i>		

9. Corroborating the discipline content with the expectations of the epistemic community representatives, of the professional associations and of the relevant employers in the corresponding field

In order to identify new ways of modernization and continuous improvement of teaching and course content with the current issues and practical problems, teachers will participate in the annual session of INCDA Fundulea and National Genetics and Breeding session where together with farmers, debating issues regarding present and future of plant breeding in Romania.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
10.4. Course	<ul style="list-style-type: none"> - Knowledge of the origin areas of cultivated plants. - Aspects of variability creation. - Role of pollination type in choosing the breeding processes. - Knowledge of the main selection schemes - Knowledge of cultivars types - Mutations, polyploidy and modern biotechnology in plant breeding 	Exam	70%
10.5. Seminar/Laboratory	<ul style="list-style-type: none"> - Cunoașterea arealelor de origine a plantelor de cultură. - Rolul tipului de polenizare în alegerea procedeeelor de ameliorare. - Aspecte privind crearea variabilității. - Mutațiile, poliploidia și biotehnologiile în ameliorare. - Cunoașterea principalelor scheme de selecție - Cunoașterea tipurilor de cultivare. 	Colloquy	30%

10.6. Minimum performance standards

Acquiring information transmitted in the course and practical work at a level to promote forms specified.

- 1 Cycle of studies - choose one of the three options: Bachelor/Master/Ph.D.
- 2 according to the educational plan
- 3 Discipline status (compulsoriness) - choose one of the options - DI (compulsory discipline) DO (optional discipline) DFac (facultative discipline).
- 4 One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on
04.09.2019

Course coordinator
Associate prof. dr. Leon MUNTEAN

Laboratory work/seminar coordinator
Assistant prof. dr. Andreea ONA

Approved by the
department on
05.09.2019

Head of the Department
Professor dr. Marcel DUDA

Doana