UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
Facultatea de Agricultură
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No._____of _____ USAMV form 0102030108

SUBJECT OUTLINE

1. General data

1.1. Higher Education Institution	University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca
1.2. Facultaty	Agriculture
1.3. Departament	Department of Technical and Soil Sciences
1.4. Domain of study	Agronomical
1.5. Level of study[1)]	Licence
1.6. Specialization/ Program of study	Mountainology
1.7. Form of teaching	IF (ZI)

2. Characteristics of the course

2.1. Name of the course	**Experimental Technique**							
2.2. Course leader				Prof. dr. Teodor Rusu				
2.3. Coordinator of the laboratory/seminars activity				Lecturer dr. Moraru Paula Ioana				
2.4. Year of study	III	2.5. Semester	I	2.6. Type of Evaluation	Continously	2.7. Course regime	Content[2]	DD
							Level of complulsory[3]	DI

3. Total estimated time (hours/semester for the teaching activities)

3.1. Number of hours/week– frequency form	4	of which care: 3.2. course	2	3.3. seminar/ laboratory/ project	2
3.4.Total hours in the teaching curricula	56	of which: 3.5.course	28	3.6.seminar/laboratory	28

Distribution of time	hours
3.4.1.Study based on hand book, notes, bibliography	20
3.4.2. Extra documentation in the library, on specific electronic platforms and on field	15
3.4.3. Prepare the seminars / laboratories / projects, theme, essays,reports, portofolio	15
3.4.4.Tutorial	7
3.4.5.Examination	7
3.4.6. Other activities	-

3.7. Total hours of individual study	64
3.8. Total hours on semester	120
3.9. Number of ECTS [4]	4

4. Pre-conditions (where is the case)

4.1. of curriculum	Mathematics and Statistics
4.2. of competences	Description of basic sciences, theoretical and practical underpinning the development and application of agricultural experience

5. Conditions (where is the case)

5.1. of course development	The course is interactive, students can ask questions regarding the content of the exposure. Courses are available listed for the students and the presentation is in ppt, recommended bibliography and updates being provided to date.
5.2. of seminar/laboratory/project development	Analysis of the basic rules of field placement experiences, as an essential tool for scientific research, which, by the study of the development of scientific knowledge

6. Specific competences gained

Proffesional competences	To know the basics of scientific research and development and innovation To understand the language for accessing national and international projects To acquire the methodology of organization of agricultural experience To know the methods of organizing the experiences To understand the effects of technology used in experiences To master recording methodology, statistical processing of data and interpretation of results
Transversal competences	To prove ability to assess determinants of technological progress in agriculture To be able to draw research projects and establish experimental factors of research To be able think of specific technologies in order to maintain scientific rigor To prove knowledge of the procedures to be followed in the design and organization of agricultural experiences To establish the statistical need for processing Duncan test, ANOVA, correlation, regression. To acquire the ability to exploit the results of scientific research To participate in research activities in the field experiences of the discipline

7. Suject Objectives (as a result of the specific competences gained)

7.1. Subject general objective	Experimental technique is a discipline that gives students a thorough understanding and skills regarding the organization of agricultural experiences, recording and processing statistical data, and interpreting the results.
7.2.Specific objective	Course Objectives consist of the students gain of fundamental knowledge on research - development of agricultural sciences: scientific research and technical progress, experimental techniques and research methods, interpretation of experimental data and the results. Scientific research is the determining factor of the technical and technological progress in agriculture and the language and tools to access national and international programs are basic procedures, elementary for students. They will gaine thus important concepts related to programs and research projects, drafting research methodology and establishment of experimental factors. Application of statistical analysis in agricultural sciences requires knowledge of both the basic principles of these methods and specialized industry-specific details and access to agricultural projects. Learning the means and criteria of maintaining scientific rigor, being specified rules to be followed in designing, organizing, and interpreting the results. Particularly important is how to obtain experimental data, whereas the results of statistical interpretation play relationships and interactions expressed by figures subject to statistical processing. Interpretation of results must be of an experience characterized by restraint in judgments and liability claims, so exploitation of the results is made only after analysis of variance, statistical processing with Duncan test, correlation, regression, ANOVA and other methods to exploit the results of scientific research.

8. Content

8.1.COURSE **Number of hours –28**	Methods of teaching	Observations
1. Object of discipline. Research Methods. History. The importance of field experiences. Connections with other disciplines.	Lectures	1 lecture
2. European Research Area. National agricultural research. Technological innovation and research - development. Research programs.	Lectures	1 lecture
3. Research project, setting goals and experimental factors. The concept of research project. The life cycle of the project. Elaboration of research projects. Completion, processing and exploitation of results.	Lectures	1 lecture
4. Field experience. Features. Choice. Design of experiences. Organizing experiences. Parties components of field experiences. Parceling and picketing experiences.	Lectures	1 lecture
5. The technology applied in experiments. Classification of experiments. Experimental plot (shape, size). Deformers factors of production plots, influence of margins, voids. Block. Repetition.	Lectures	1 lecture
6. Methods of alignment of plots: the blocks method, the Latin square method, the method of rectangle, the Latin grating method, the method of subdivided parcels.	Lectures	1 lecture
7. Experimental errors, definition, classification. Organization of database.	Lectures	1 lecture
8. Mathematical methods for the interpretation of experimental data, the arithmetic	Lectures	1 lecture

mean, geometric mean. Quatrilele. Modal value, median. **9. Frequency distribution**. Analysis of variance. Total dispersion. T test ANOVA F test.	Lectures	1 lecture
10. Duncan test. The correlation coefficient r multiple correlation coefficient.	Lectures	1 lecture
11. Analysis of the relationship between variables. Coefficient of determination. Regression coefficient.	Lectures	1 lecture
12. Calculation and analysis of experimental data. Product rule. Sum rule. Binomial distribution. Probabilities for combinations of events. Multinomial distribution. Chi-square test.	Lectures	1 lecture
13. Demonstration plots. Pedo-climatic database. Choice land and surface demonstration plots. The number of repetitions and methods of settlement of demonstration plots. The technology applied in demosntrative lots.	Lectures	1 lecture
14. Parceling, picketing and demonstration of plots labeling. Observation, assessment and demonstration plots determinations. Collection and presentation of demonstration plots. Evaluation of agricultural production	Lectures	1 lecture

8.2.PRACTICAL WORK **Number of hours – 28**		
1. Core elements in the experimental technique. Experimental terminology. Experimental factors. Surfaces of experiences.	Laboratory	1 seminar
2. Calculation of the size of experimental plots. Designing experiences with crops sown in thick rows, designing experiences with weeding plants.	Laboratory	1 seminar
3. Position of an experience in the field by using a sketch , picketing, parceling, synthetic fertilizers administration, works of the soil. Installing the experiences.	Field work	1 seminar
4. Harvesting of experimental data, deletions side, gaps and determining the area harvested.	Field work	1 seminar
5. Evaluation of production in demonstration plots. Presentation of demonstrative lots.	Laboratory	1 seminar
6. Calculation and interpretation of the results obtained in field experiences monofactorial placed after the randomized blocks method.	Laboratory	1 seminar
7. Calculation and interpretation of the results obtained in field experiences monofactorial placed after the Latin square method.	Laboratory	1 seminar
8. Calculation and interpretation of the results obtained in polifactorial field experiments.	Laboratory	1 seminar
9. Experimental Data Recovery for monofactorial experiences. Analysis of variance and determining the significance using DL.	Laboratory	1 seminar
10. Experimental Data Recovery for monofactorial experiences placed by using a latin square method. "T" test and Duncan test.	Laboratory	1 seminar
11. Experimental Data Recovery for monofactorial experiences arranged by using a the Latin rectangle method.	Laboratory	1 seminar
12. Experimental Data Recovery ata for bifactorial experiences by using the method of arranged subdivided parcels.	Laboratory	1 seminar
13. Experimental Data Recovery for bifactorial experiences placed following subdivided parcels method (computer processing).	Laboratory	1 seminar
14. Laboratory data obtained from the computer program PoliFact 2004	Laboratory	1 seminar

Compulsoru bibliography:

1. *1.Experimental Technique and field demonstration.* Rusu, T., 2011, Course lithographied, Publisher AcademicPres USAMV Cluj-Napoca.

Facultative bibliography:

1. *Experimental Technique.* Gush, P., 1983, Course TIPO "Agronomy", Cluj-Napoca.
2. *Experimental Technique. Master,* Al., 2003. Course lithographs, Publisher AcademicPres, Cluj-Napoca.
3. *Statistical Methods in agricultural and biological experiments.* Ceapoiu, N., 1958 Publisher Agroforestry, Bucharest.
4. *Field experience.* Issue-II, NA Săulescu, Săulescu NN, 1969. Agro Publishing, Bucharest.
5. *Practical work in agricultural technology and experimental technique.* Part-II, Sebok Peter P.Guş, Al.Meşter, 1986. Tipo Agronomy, Cluj-Napoca.

9. Corroboration of the subject content with teh expectations of the epistemic communities` representatives,of the proffesional associations and representatives employers in the domain

Students learning the language and tools to access national and international programs as basic procedures, basic for young researchers. The role of research is essential, in the creation of biological conditions and economic and

technical underpinning sustainable agriculture and economic efficiency. Application of statistical analysis in agricultural sciences requires knowledge of both the basic principles of these methods and specialized industry-specific details.

Scientific research in agriculture is very complex due to the existing biodiversity, culture and technology specific relationships that may exist between production, environment, efficiency and yield.

Field experience is an essential tool for scientific research, which, by the study of phenomena, the expansion of scientific knowledge. It is the most solid foundation on which build agricultural sciences.

Appropriation and understanding of research methodology provides students with a thorough understanding and skills regarding the organization of agricultural experiments, recording data and their statistical processing and interpretation of results.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percent of the final grade
10.4. Course	Knowledge of the organization of agricultural experiences, recording and processing statistical data, and interpreting the results.	oral exam	70%
10.5. Seminar / Laboratory	Knowing the language and tools to access national and international programs Acquisition by students of technical knowledge of the field placement experiences and organization experience. Training students' ability in statistical processing of the experimental data, interpretation of results and operating correctly computed using statistical programs and calculation formulas.	2 -verifications during the semester	30%
10.6.Minimal standard of performance			
Mastering scientific information conveyed through lectures and practical work at an acceptable level. Obtaining the pass mark in continuous assessment is the condition of graduation			

1 level of study – to be chosen one of the following – Bachelor /Post graduate/Doctoral

2 Course regime (content) - for bachelor level it will be chosen one of the following - **DF** (fundamental subject), **DD** (subject in teh domain), **DS** (specific subject), **DC** (complementary subject).

3 Course regime (compulsory level) - to be chosen one of the following – **DI** (compulsory subject) **DO** (Optional subject) **DFac** (Facultative subject).

4 One ECTS is equivalent with 25-30 de hours of study (didactical and individual study).

Filled in on
04.09.2019

Course coordinator
Prof. dr. Rusu Teodor

Laboratory work/seminar coordinator
Lecturer dr. Moraru Paula Ioana

Approved by the department on
05.09.2019

Head of the Department
Conf. dr. Ranta Ovidiu