



UNIVERSITATEA DE ȘTIINȚE AGRICOLE ȘI MEDICINĂ VETERINARĂ CLUJ-NAPOCA

Facultatea de Agricultură

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No. _____ of _____

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SUBJECT OUTLINE

1. General data

1.1. Higher Education Institution	University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca
1.2. Faculty	Agriculture
1.3. Department	Department of Technical and Soil Sciences
1.4. Domain of study	Agronomy
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		Agrotechnics and Herbology I						
2.2. Course leader				Prof. dr. Teodor Rusu				
2.3. Coordinator of the laboratory/seminars activity				Lecturer dr. Adrian Ioan Pop				
2.4. Year of study	II	2.5. Semester	II	2.6. Type of Evaluation	Continuously	2.7. Course regime	Content ²	DD
							Level of compulsory 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	Soil Science, Agrochemistry, Botany, Biochemistry
4.2. of competences	Description of scientific foundations, theoretical and practical, underlying the development and application of technologies for sustainable agricultural production

5. Conditions (where is the case)

5.1. of course development	The course is interactive, students can ask questions regarding the exposure content. Courses are available for the students listed, power point presentation, Recommended and updates are provided to date.
5.2. of seminar/ laboratory /project development	Practical works are carried out based on "Book for Practical Work in Agrotechnics" which involves determining and understanding the measures of vegetation factors regulating, monitoring and optimization of the indicators of soil fertility, proper execution of soil tillage, increase the productive potential of less productive land and unproductive, introduction aside new land and new tillage systems.

6. Specific competences gained

Professional competences	<p>To know the land fund of Romania and problems of contemporary agrotechnics.</p> <p>To understand the living environment of plants and control methods for vegetation factors.</p> <p>To know the methodology of technological characterization of the land and establishing agrotechnical interventions.</p> <p>To know the methods soil fertility control.</p> <p>To understand the effects of soil tillage, conventional soil tillage systems.</p> <p>To know the weeds from agricultural and horticultural crops and combating methods.</p> <p>To know the principles of development of conservative soil tillage systems with minimum tillage and direct sowing.</p>
Transversal competences	<p>To demonstrate the ability to study the cultural profile of the soil and the ability to collect soil samples.</p> <p>To perform measurements on soil structure and measurement of the thermal characteristics of the land</p> <p>To think scientific activities related to relations of soil with water and soil water movement.</p> <p>To demonstrate the ability to determine the technological properties of soil in relation to agricultural machinery.</p> <p>To establish need of agrotechnical interventions and to check their quality.</p> <p>To build the capacity to measure physics and atmosphere characteristics of the soil.</p> <p>To participate in research activities in the field experiences of the discipline.</p>

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

7.1. Subject general objective	Learning how to control the relationships between vegetation factors, soil and crop in order to develop technical procedures of growing plants under rational exploitation of soil and environmental preservation.
7.2. Specific objective	<p>Learning the scientific bases Agrotechnics (natural resources used, biological and technological factors), objectives and research methods, knowledge of Romanian land fund and land degradation processes (physical, chemical, biological, complex) classification of agricultural systems.</p> <p>Increasing knowledge regarding the living environment of plants, environmental conditions, growth factors and their control methods in order to obtain high yields and high quality in terms of conservation of resources used in production. Identifying, monitoring and improving soil fertility indices and technological characterization of land.</p> <p>Knowledge of soil tillage and tillage systems in terms of its purpose, agro-technical requirements, mode and time of execution, assessment and determination of the soil tillage quality, developing of conventional and unconventional tillage systems to optimize soil characteristics to meet crop requirements.</p> <p>To know agrotechnical interventions and measures to increase soil fertility by determining hydrostability of soil structure, indicators of soil status settlement (bulk density, porosity, penetration resistance, degree of compaction, agro index), soil water relations (hydropysical indices, permeability and capillary rise of water in the soil) and soil respiration.</p> <p>Deepening methodology and indicators for evaluation the quality of tillage, seedbed, the work of hoeing, rollers and leveling of the land, as measures to prevent soil erosion and as a means of efficient agrotechnical interventions.</p>

8. Content

8.1.COURSE	Methods of teaching	Observations
<p>Number of hours – 28</p> <p>1. Objective and agrotechnics role in the development of agricultural production and soil conservation. 1.1.The importance and role of agrotechnics. 1.2. Agrotechnics connection with other sciences. 1.3. Agrotechnics objectives. 1.4. Agrotechnics research methods.</p> <p>2. Agrotechnical bases of agricultural production. 2.1. Agrotechnics in relation with system and agro system. 2.2. Natural resources used (land, water, environment). 2.3. Biological factors of agricultural production. 2.4. Technological factors of agricultural production.</p> <p>3. The land fund of Romania and modern agro-technical issues. 3.1. The land fund of Romania, structure and quality. 3.2. Agrotechnics in relation to land degradation phenomena. 3.3. Agrotechnics in the evolution of farming systems.</p> <p>4. Living environment of plants. 4.1. Environmental conditions (topography, rock, soil). 4.2. Growing factors, scientific basis of crop production. Classification and characteristics of vegetation factors.</p>	Lecture	2 lectures
	Lecture	1 lecture
	Lecture	1 lecture
	Lecture	1 lecture

<p>5. Growth factors and methods of control. 5.1. Light. 5.2. Heat. 5.3. Air. 5.4. Water as a factor of vegetation. 5.5. Nutrients. 5.6. The main groups of microorganisms in the soil. 5.7. Correlation between microorganisms and soil fertility. 5.8. Agro-technical methods of control of biological processes in the soil. 5.9. The interaction between vegetation factors and the relationships between them and crop production. 5.10 Agrotechnical methods of vegetation factors control.</p> <p>6. Soil fertility and its control methods 6.1. Definition. Fertility categories 6.2. Determination, interpretation and improvement of agro-physical indicators of soil fertility. 6.3. Determination, interpretation and improvement of hydro-physical indicators of soil fertility. 6.4. Determination, interpretation and improvement of agrochemical indicators of soil fertility. 6.5. Determination, interpretation and improvement of agro-biological indicators of soil fertility. 6.6. Technological characterization of land.</p> <p>7. Soil tillage. 7.1. Evolution of soil tillage methods. 7.2. Definition, objectives, classification. 7.3. Technological processes of soil tillage. 7.4. Soil tillage influence in soil fertility regulating. 7.5. Influence of soil tillage on weed control, disease and pests. 7.6. Influence of soil tillage in improving agricultural production process. 7.7. Basic soil tillage (plowing, turning without flipping furrow, unclog, turning deep - scraping, digging and soil modeling). 7.8. Seedbed preparation tillage. 7.9. Soil tillage to maintain the fields after sowing.</p> <p>8. Tillage systems. 8.1. Definitions and characteristics. 8.2. The classical (conventional) system. 8.3. The tillage system for winter crops. 8.4. The tillage system for spring crops. 8.5. The tillage system for successive crops. 8.6. The tillage system for compromised crops.</p> <p>9. Unconventional tillage systems. 9.1. Rationalized tillage systems. 9.2. Minimum tillage systems. 9.3. Mulch tillage systems. 9.4. The coating tillage system. 9.5. Ridge tillage system. 9.6. The tillage system in strips or narrow strips. 9.7. No-tillage system or direct seeding.</p>	Lecture	3 lectures
	Lecture	1 lecture
	Lecture	2 lectures
	Lecture	1 lecture
	Lecture	1 lecture

<p>8.2. PRACTICAL WORK Number of hours – 14</p>		
<p>1. Safety rules. The objectives of practical work at Agrotechnics. Soil tillage: objectives and effects. Cultural profile of the soil: the arable layer, the subari layer. Soil properties modifiable by agricultural technologies.</p> <p>2. Determination, under field conditions, of indicators necessary for development of differentiated management practices (tillage optimal time, opportunity and the type of required work, soil sampling, pH determining by Portable pH sensor Sentix SUR, kit for soil chemical analysis LaMotte STH-5-5007 etc.).</p> <p>3. Checking and assessing of soil basic tillage quality performed under different conditions of soil, moisture and preceding plant. Inspecting and evaluating the quality of sowing at winter crops.</p> <p>4. Determination of water and mechanical stability of the soil structure. Method Tiulin - Erikson, Sekera Method Method Czeratzki. Interpretation of results of hydric stability at soil structure.</p> <p>5. Determination of soil resistance to penetration using penetrometer Fieldscout SC 900 Soil Spectrum. Determination of soil permeability for water by digital infiltrometer with alarm Sonara Turf Tec. Infiltration determination using the permeameter Munz-Faure - Laine.</p> <p>6. Determination of moisture content (gravimetric, electrometric moisture meter with gypsum blocks Delmhorst KS-D1, Jet fil ARL 2725 sphygmomanometer, digital alarm infiltrometru Sonara Turf Tec Digital Thermo-hygrometer Aquaterra Temp 300), permeability to water (filtrate - cylinders and gradient method constant) and soil air, adhesion, compactness, capillary total capacity of the soil. Determination of the soil hydrosyphical indicators (CH, CO, CC, CC, CT).</p> <p>7. Determining the optimal parameters for soil tillage (IUA, IOU, IOU-L, IOU-P). Calculation of useful water reserve in the soil. Otimizarea of settlement status (bulk density, porosity, degree of compaction) of the soil by tillage system.</p>	Laboratory	One work
	Field work	2 works
	Field work	2 works
	Laboratory	2 works
	Field work	2 works
	Laboratory	3 works
	Laboratory	2 works
<p><i>Compulsory bibliography:</i></p> <ol style="list-style-type: none"> 1. <i>Agrotehnică</i>, Rusu, T., 2005, Editura Risoprint, Cluj-Napoca. 2. <i>Îndrumător de lucrări practice la Agrotehnică</i>, Rusu, T., I. Bogdan, A. I. Pop, 2012, Editura Grinta, Cluj-Napoca. 		
<p><i>Facultative bibliography:</i></p> <ol style="list-style-type: none"> 1. <i>Fizica, hidrofizica, chimia și respirația solului – Metode de cercetare</i>, Rusu, T., L. Paulette, H. Cacovean, V. Turcu, 2007, Editura Risoprint Cluj-Napoca. 2. <i>Ecotehnica</i>, Rusu, T. și colab., 2005, Editura Risoprint, Cluj-Napoca. 		

3. *Agrotehnică*, Guș, P., T. Rusu, I. Bogdan, 2004, Editura Risoprint, Cluj-Napoca.
4. *Sisteme convenționale și neconvenționale de lucrare a solului*, Guș, P., T. Rusu, I. Bogdan, 2003, Editura Risoprint, Cluj-Napoca.
5. *Lucrările neconvenționale ale solului și sistema de mașini*, Guș, P., T. Rusu, S. Stănilă, 2003, Editura Risoprint, Cluj-Napoca

9. Corroboration of the subject content with the expectations of the epistemic communities' representatives, of the professional associations and representatives employers in the domain

Learning students to study the system soil - plant - cultivation technologies and measures to control vegetation factors, the study of the biological basis of agricultural production, horticulture, forestry and means of regulating, development of the agricultural system and soil tillage with purpose to preserve resources used in the production process.

Learning and understanding the action of vegetation factors (heat, light, water, air, nutrients, soil biological activity), knowledge the bases of soil fertility, soil fertility indices, the influence of soil tillage on his characteristics, developing conventional and unconventional soil tillage systems, optimizing soil characteristics and other environmental factors that favor the crop. Knowledge of measures to increase the productive potential of less productive soil and unproductive soil, improving soil tillage systems for different climatic conditions, differentiated agrotechnics, stability of agricultural ecosystems, relationships between them and other ecosystems. Agriculture systems, organic farming, biological , etc., development of sustainable land system use and sustainable agriculture. Measuring soil physics and hydrophysics using next-generation devices.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percent of the final grade
10.4. Course	Knowing the fund land of Romania and contemporary agrotechnical problems; living environment of plants and methods of control for vegetation factors; the methods to control soil fertility; the effects of soil tillage, conventional systems, minimum tillage and direct seeding;	oral exam	70 %
10.5. Seminar/ Laboratory	Knowing the cultural profile of the soil and harvest soil samples, determining soil structure and measurement thermal characteristics of land; interpretation of relations soil -water and water movement in soil; determine the technological properties of soil in relation to agricultural machines; setting and checking the quality of agrotechnical interventions; determining agrophysical field characteristics.	2 test evaluation	30 %
10.6. Minimal standard of performance Mastering scientific information transmitted through lectures and practical work at an acceptable level. Obtaining the pass mark in continuous evaluation 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 the 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. Teodor Rusu

Laboratory work/seminar coordinator
Lecturer dr. Pop Adrian Ioan

Approved by the
department on
05.09.2019

Head of the Department
Conf. dr. Ranta Ovidiu