

## 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	Faculty of Agriculture
1.3. Department	Plants Breeding
1.4. Field of study	Agronomy
1.5. Cycle of study <sup>1</sup>	Bachelor
1.6. Specialization/ Study programme	Agriculture
1.7. Form of education	Full time

## 2. Information on the discipline

2.1. Name of the discipline	Mathematics and Statistics							
2.2. Course coordinator	Associate Prof PhD. Rodica Sobolu							
2.3. Seminar/ laboratory/ project coordinator	Lecturer PhD. Luisa Andronie							
2.4. Year of study	I	2.5. Semester	I	2.6. Type of evaluation	continue	2.7. Discipline status	Content <sup>2</sup>	FD
							Compulsoriness <sup>3</sup>	CD

## 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 book, textbook, bibliography and notes					10
3.4.2. Additional documentation in the library, specialized electronic platforms and field					10
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					10
3.4.4. Tutorials					10
3.4.5. Examinations					4
3.4.6. Other activities					
3.7. Total hours of individual study	44				
3.8. Total hours per semester	100				
3.9. Number of credits <sup>1</sup>	4				

## 4. Prerequisites (is applicable)

4.1. curriculum-related	Applied computer science.	-
4.2. skills-related	The student needs basic computer usage skills.	-

## 5. Conditions (if applicable)

5.1. for the lecture	The course is interactive, students can ask questions regarding the content of exposure. Academic discipline requires compliance of the start and end of the course. We do not allow any other activities during the lecture, mobile phones will be closed down.
5.2. for the seminar/ laboratory/ project	At practical each student will develop an individual activity with laboratory materials (made available in the book that describes the laboratory work). Academic discipline is imposed throughout the development of practical work.

## 6. Cumulated specific competences

Professional competences	<p>Collecting, analyzing and interpreting data from a quantitative and qualitative point of view, from different sources, formulating arguments, decisions and concrete steps.</p> <p>The ability to process, synthesize and interpret a set of information, to solve basic problems and to evaluate possible solutions.</p> <p>Design, development and maintenance of green areas.</p> <p>Designing and building of access roads, the circulation system and earthworks within green spaces.</p> <p>Ensuring the optimum moisture by installing irrigation systems and land drainage.</p>
Transversal competences	<p>Solving effective problem with medium difficulty.</p> <p>Promoting a responsible attitude towards agriculture.</p> <p>Identifying opportunities for training and efficient use of information resources.</p> <p>Applying effective communication techniques and networking at the organizational level.</p> <p>Realistic approach to agricultural problems using probabilistic laws and optimization techniques.</p>

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

7.1. General objective	<p>Acquisition by students of the mathematical instrument to be used for the analyses and modeling of various phenomena encountered in their specific courses.</p> <p>Comprehend the basic ideas of statistical inference and data collection.</p> <p>Determine the appropriate statistical procedure, given the description of the experiment.</p>
7.2. Specific objectives	<p>Mathematical modeling of practical problems commonly used in biological and agricultural research.</p> <p>Educating students in the spirit of more realistic approaches to problems in agriculture by using probabilistic laws and optimization techniques.</p> <p>Perform independently data analysis techniques with the computer.</p>

## 8. Content

<p><b>8.1. LECTURE</b> Number of hours – 28</p> <p><b>Mathematical Analysis. Basic Concepts.</b> Functions on <math>\mathbb{R}</math>. The derivative function. Derivatives of elementary functions. Properties of derived functions. Functions study using the derivatives. The Golden Ratio and Fibonacci Numbers. The Fibonacci sequence in nature.</p> <p><b>Analytic Geometry.</b> The line. Circle. Ellipse. Parabola.</p> <p><b>Probability Calculus.</b> Experiments, events. The classical definition of probability. Properties of the probability function. Discrete distributions. Random variables. Definition. Properties. Discrete random variable. Continuous random variable. Discrete probability distribution. Probability Density Function. Numerical parameters of random variables (the average, the dispersion, the mean square deviation)</p> <p><b>Biological Statistics.</b> Statistical population. Sample. The absolute frequency. The relative frequency. The frequency distribution. Statistical graphics. Descriptive statistics. Measures of central tendency (the mean, the mode and the median). Measures of dispersion (the variance, the standard deviation, the coefficient of variation). The correlation coefficient. The linear regression. Statistical inference. Confidence interval. Estimation theory. Hypothesis testing. Analysis of</p>	<p>Teaching methods</p> <p>Lecture</p> <p>Class will generally begin with questions. An overview of the new material will be given.</p> <p>The students will actively participate in the development of the new material.</p> <p>Then the students will be given problems similar to the homework.</p>	<p>Notes</p> <p>1 lecture = 2 hours</p> <p>2 lectures</p> <p>2 lectures</p> <p>4 lectures</p> <p>6 lectures</p>
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variance.		
The use of specific software in order to solve practical problems: R-Statistics, Microsoft Excel.		

<p><b>8.2. PRACTICAL WORK</b>  <b>Number of hours – 28</b>  <b>Mathematical Analysis. Basic Concepts. Functions on R.</b> The derivative function. Derivatives of elementary functions. Properties of derived functions. Functions study using the derivatives. The Golden Ratio and Fibonacci Numbers. The Fibonacci sequence in nature.</p> <p><b>Analytic geometry.</b> The line. Circle. Ellipse. Parabola.</p> <p><b>Probability Calculus.</b> Experiments, events. The classical definition of probability. Properties of the probability function.  Discrete distributions. Random variables. Definition. Properties. Discrete random variable. Continuous random variable. Discrete probability distribution. Probability Density Function. Numerical parameters of random variables (the average, the dispersion, the mean square deviation)</p> <p><b>Biological Statistics.</b> Statistical population. Sample. The absolute frequency. The relative frequency. The frequency distribution. Statistical graphics. Descriptive statistics. Measures of central tendency (the mean, the mode and the median). Measures of dispersion (the variance, the standard deviation, the coefficient of variation). The correlation coefficient. The linear regression. Statistical inference. Confidence interval. Estimation theory. Hypothesis testing. Analysis of variance.</p> <p>The use of specific software in order to solve practical problems: R-Statistics, Microsoft Excel.</p>	<p>Theoretical presentation of practical works</p> <p>Theoretical presentation of practical work  Class will generally begin with questions about homework. An overview of the material will be given. The students will actively participate in the development of this review. Then the students will be given problems similar to that have made on courses.</p>	<p>1 lab work (2 hours / work)  2 practical works</p> <p>2 practical works</p> <p>4 practical works</p> <p>6 practical works</p>
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*Compulsory bibliography:*

1. *Lecture class. Text books. Printed materials.*
2. *Micula Maria, Matematici aplicate in agronomie, Casa de Editura Transilvania Press, Cluj - Napoca, 1997.*
3. *Maria Micula, Matematici aplicate, Editura Digital Data, Cluj-Napoca, 2000.*
4. *The analysis of biological data by Michael Whitlock and Dolph Schluter. W. H. Freeman. 2014.*
5. *Blaga Petru, Statistica prin MATLAB, Presa universitară clujeană, Cluj-Napoca, 2002.*
6. *R. Lyman Ott; Michael T. Longnecker. An Introduction to Statistical Methods and Data Analysis. 6th ed. 1296 p. (2010).*

*Optional bibliography:*

1. Trâmbițaș Radu, Metode statistice, Presa Universitară Clujeană, Cluj - Napoca, 2000.
2. Morris Kline, Mathematics for the Nonmathematician, Dover Publications, Inc., New York. 1995.
2. <http://mathworld.wolfram.com/>
3. <http://www.math.com>
4. <http://probability.infarom.ro/>

**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**

The course content is according to the content of the courses in other Romanian and foreign universities. For a better matching with the market requests the bussines environment was involved in the practical works definition.

**10. Evaluation**

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
<b>10.4. Course</b>	Written exam (competences of the mathematical methods presented)	Written and oral exam	70%

	during the courses and the practical works)		
<b>10.5. Seminar/Laboratory</b>	1 intermediate test paper (subjects list announced during the practical works	Intermediate test papers	30%
<b>10.6. Minimum performance standards</b>			
Knowledge of the matter presented during the courses and practical works equivalent to the 5 mark. Obtaining passing mark at the intermediate test papers is needed for taking the written exam.			

<sup>1</sup> Cycle of studies- choose of the three options: Bachelor/Master/Ph.D.

<sup>2</sup> Discipline status (content)- for the undergraduate level, choose one of the options:- **FD** (fundamental discipline), **BD** (basic discipline), **CS** (specific disciplines-clinical sciences), **AP** (specific disciplines-animal production), **FH** (specific disciplines-food hygiene), **UO** (disciplines based on the university's options).

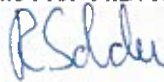
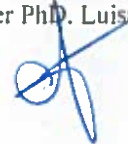
<sup>3</sup> Discipline status (compulsoriness)- choose one of the options – **CD** ( compulsory discipline) **OD** (optional discipline) **ED** ( elective discipline).

<sup>4</sup> One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on  
4.09.2019

Course coordinator  
Associate Prof. PhD. Rodica Sobolu

Laboratory work/seminar coordinator  
Lecturer PhD. Luisa Andronic

Approved by the  
department on  
5.09.2019

Head of the Department  
Prof PhD. Marcel Duda

