COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_100**	**SEMESTER**	**1ST**
COURSE TITLE	**GENERAL AND INORGANIC CHEMISTRY**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background (General Chemistry) Skills Development (Experimental General and Analytical Chemistry)
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, is able to:

• knows the structure of the individual

• understands the placement of the elements in the Periodic Table and recognizes basic physical and chemical properties of the elements based on their position in the Periodic Table

• understands chemical formulas and nomenclature of inorganic chemical compounds

• recognizes the different categories of chemical reactions (transposition-redox) and expresses them comprehensively

• performs stoichiometric calculations and correctly expresses the results

• knows the safety rules of a chemical laboratory as well as to properly handle the basic utensils and instruments of a chemical laboratory

• recognizes chemical reagents and understands how to handle them

• prepares solutions and knows the ways of expressing their concentration

• selects appropriate protolytic markers and performs pH calculations

• applies the basic analytical techniques of Chemistry (volumetric analysis, gravimetric analysis, instrumental methods of chemical analysis)

• evaluates the results of a chemical analysis
• handles organology

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of this course the student will have further developed the following skills (general skills):
• Ability to identify and name utensils and instruments of a chemical laboratory
• Ability to record and keep a proper laboratory diary
• Ability to process experimental measurements and yield results in the correct format
• Ability to find information from any book of General and Analytical Chemistry as well as from sources on the internet

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Respect for the natural environment
Exercise criticism and self-criticism

(3) SYLLABUS

1. Chemistry and measurements
2. Atoms, Molecules, Ions, Atomic and Molecular Structure, Periodic Table
3. Oxidation number, chemical bond, chemical formulas and nomenclature of simple chemical compounds
4. Solutions, Solubility, Standard Solutions
5. pH, Buffers
6. Chemical reactions, Chemical equations and stoichiometric calculations
7. Neutralization Reactions, Redox Reactions, Complexation Reactions, Precipitation Reactions
8. Qualitative Analysis, Analysis of the most important groups of cations and anions
9. Quantitative Analysis, Classification of methods of classical and instrumental quantitative analysis, Gravimetric analysis, Volumetric analysis,
10. Chromatography-Types of Chromatography, Electrochemical methods of analysis-Potentiometry,
11. Optical methods of analysis - Ultraviolet-visible absorption spectrophotometry, Infrared spectrophotometry,
12. Emission spectrophotometry, Atomic absorption
13. Repeat Summary

Laboratory Exercises

1. Introduction to the Laboratory-Safety and hygiene rules
2. Chemical Laboratory Utensils and Instruments

3. Chemical Reagents and their use
4. Basic Laboratory Techniques
5. Uncertainty of experimental measurements-Significant digits
6. Solution content
7. Dilution of Solutions
8. Sediment formation
9. Properties of metals and non-metallic elements
10. Indicators-Colorimetric determination of pH
11. Electrometric determination of pH-Use of pH-meter

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face deliveries. Laboratory exercises in General and Analytical Chemistry
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them. 2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

Activity	***Semester workload***
Lectures	39
Laboratory	26
Writing short reports of laboratory exercises	13
Final Exams	3
Study hours and preparation for the laboratory exercises and the final examination	44
Course total	***125***

(5) ATTACHED BIBLIOGRAPHY

1. D. D. Ebbing, S. D. Gammon, 2011. Γενική Χημεία, Εκδόσεις Τραυλός
2. D. A. Skoog, F. James Holler, T. A. Nieman, 2010. Αρχές Ενόργανης Ανάλυσης, Εκδόσεις Κωσταράκη
3. Σ. Λιοδάκης, 2001. Αναλυτική Χημεία, Εκδόσεις Παπασωτηρίου
4. Κ. Ξένος, 2006. Αναλυτική Χημεία, Μακεδονικές Εκδόσεις
5. ΕΙΣΑΓΩΓΗ ΣΤΗΝ ΑΝΟΡΓΑΝΗ ΚΑΙ ΓΕΝΙΚΗ ΧΗΜΕΙΑ, (2η Έκδοση/2014), Νικόλαος Χατζηλιάδης, Διαθέτης (Εκδότης) UNIBOOKS ΙΚΕ, ISBN: 9789609322072
6.Γενική Χημεία, 13η Έκδοση, Brown T., LeMay E., Burste B., Murphy C., Woodward P., Stoltzfus M., Εκδόσεις Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., ISBN:9789604185153

-Συναφείς επιστημονικές πηγές και περιοδικά:

- *Journal of Chemical Education (ACS Publications) http://pubs.acs.org/journal/jceda8*
- *https://en.wikibooks.org/wiki/Introduction_to_Inorganic_Chemistry#Chapter_1:_Review_of_Chemical_Bonding*
- *http://library.aceondo.net/ebooks/Chemistry/General_Chemistry_9th-Ebbing.Gammon.pdf*Journal of Cleaner Production,
Conservation and Recycling,
Waste Management

COURSE OUTLINE

(6) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_110**	**SEMESTER**	**1ST**
COURSE TITLE	**MATHEMATICS I**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. Knowledge of High School Mathematics is required
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(7) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the course Mathematics I is a tool for the students of the Department of Biosystems Science and Agricultural Engineering which aims to introduce and familiarize them with the concepts and methodologies of applied mathematics for engineers which are a tool in their science. The subject of the course includes an introduction to Differential and Integral Calculus and Linear Algebra. This knowledge is required as a basis for supporting the learning process of the EVGM specialty.

Upon successful completion of the course the student will be able to: effectively use differential and integral calculus as well as linear algebra in the next courses of his studies in the field of Biosystems Science and Agricultural Engineering.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and

Working independently *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*
1. Autonomous Work 2. Teamwork 3. Decision Making 4. Critical analytical and synthetic thinking for solving mathematical problems in Agricultural Engineering	

(8) SYLLABUS

1. 1. Differential calculus of functions of a variable
2. Integral calculus of functions of a variable
3. Rows of numbers and functions
4. Table Theory
5. Defining
6. Linear dependence and independence
7. Homogeneous Systems of linear equations
8. Non-Homogeneous Systems of Linear Equations
9. Eigenvalues - Eigenvectors
10. Operators
11. Vectors and Coordinate Systems in 3D Space.
12. Problem solving
13. Overlay-Summary

(9) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical*	Written or oral final exam with physical presence or online with or without contribution of project work during the semester The evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods,

Activity	***Semester workload***
Lectures	39
Tutorials	26
Unguided study	57
Final Exams	3
Course total	***125***

examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(10) ATTACHED BIBLIOGRAPHY (IN GREEK)

- *Ξένος Θ., Γραμμική Άλγεβρα, Εκδόσεις Ζήτη, Θεσσαλονίκη, 2004*
- *MorrisA.O., Μια εισαγωγή στη γραμμική άλγεβρα, Μετ. Δ.Ι. Δεριζιώτη, Εκδόσεις Πνευματικού, Αθήνα, 1980*
- *Φελλούρης Σ., Γραμμική άλγεβρα και αναλυτική γεωμετρία, Εκδόσεις Τρίτη, Αθήνα, 1989*
- *Γραμμική άλγεβρα και εφαρμογές, Strang, GilbertΠάμφιλος, Πάρις Κ. , - 1995 2013*
- *Γραμμική άλγεβρα, Στρατηγόπουλος Δημήτρης - 1980*

COURSE OUTLINE

(11) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_120**	**SEMESTER**	**1ST**
COURSE TITLE	**PHYSICS I**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. Knowledge of High School Physics and Mathematics is required
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(12) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the Physics course is a background object for the students of the Department of Biosystems Science and Agricultural Engineering, which aims to introduce them to the concepts and methods used to represent and study the various phenomena of the natural world. This knowledge is necessary because it is used to understand complex phenomena related to the field of Biosystems Science and Agricultural Engineering.

The aim of the course is to give the student the knowledge mainly of Engineering and Electromagnetism which are necessary and used in many subsequent courses

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of the course the student will have acquired the ability to understand and interpret the meaning of basic phenomena that govern physical processes and are expressed quantitatively using mathematics. Additional goal is to be able to:
1. Autonomous Work
2. Teamwork
3. Decision Making
4. Work in an interdisciplinary environment

(13) SYLLABUS

1. Physical Quantities, Units, Mathematics with Applications in Physics (basic principles of vector and differential calculus)
2. Linear and curvilinear motions of a particle (kinematic study in mono-, bi-, and three-dimensional space)
3. Periodic particle motions: Smooth circular motion, Simple harmonic oscillation
4. Newton's laws of particle motion.
5. Momentum, impulse and impact between particles. Momentum Theorem, Principle of conservation of momentum
6. Work of Power and Energy. Energy conservation principle
6. Conservative and non-conservative forces. Gravity
7. Solid state mechanics (kinematic, dynamic and energy study, Principles of energy conservation and rotation in rotational motion)
8. Wave (mechanical waves, traveling and standing waves, mechanical wave contribution)
9. Fluid mechanics in equilibrium and motion (Equations of matter conservation, continuity, Bernoulli energy conservation and dynamic motion Navier Stokes)
10. Interactions in closed e-particle systems. Kinetic theory of gases (laws of gases, Statutory equation of ideal gases, Distribution of molecular velocities, Internal energy, Entropy, thermal expansion, phase change) 11. The thermodynamic system (Reversible changes, entropy, 1st and 2nd law of thermodynamics, molecular specific gas heats, thermal and refrigeration engines, The Carnot engine)
12. Interactions in open e-particle systems: Atmospheric physics (structure and composition of the atmosphere, vertical distribution of pressure and temperature, phase changes, meteorological indicators, climatology, adiabatic changes in atmospheric air).
13. Bioclimatic indicators of biosystems.

LABORATORY EXERCISES

1. Theory of error analysis and measurement processing (distributions, mean value, measurement errors, value regressions, linear fitting to experimental points-line of least squares)
2. Principle of operation of measuring sensors and measuring instruments (sensor characteristics, precision classes, periodic waveforms, square pulses, sensitivity, structure of a measurement and recording system)
3. Measurement of distance (position), level and dimensions
4. Measurement of speed and acceleration
5. Measurement of force and torque

6. Hooke's law-Harmonic oscillation of a helical spring (Experimental verification of Hooke's law, determination of the constant k of the spring by measuring its period of harmonic oscillations and determination of the gravitational acceleration of the region)
7. Synthesis of harmonic oscillations (Study of the composition of harmonic oscillations of the same or perpendicular to each other direction investigation of the characteristics of the intersections and Lissajous shapes).
8. Fluid flow measurement
9. Contribution, wave superposition. Stationary mechanical and sound waves
10. Calculation of the Cp / Cv gas ratio
11. Study of isothermal change of ideal gas - Otto Cycle
12. Meteorological measurement systems: P, T, wind speed and direction, humidity, sunshine.
12. Processing and management of meteorological measurements.

(14) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>26</td></tr>
<tr><td>Laboratory reports work</td><td>13</td></tr>
<tr><td>Unguided study</td><td>44</td></tr>
<tr><td>Final Exams</td><td>3</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Weight is given to the demonstration of critical ability and the justification of the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(15) ATTACHED BIBLIOGRAPHY

- *ΚΙΒΒLE, T.W.B. & BERKSHIRE, F.H., ΚΛΑΣΙΚΗ ΜΗΧΑΝΙΚΗ, Έκδοση: 1η/2012, ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ & ΕΡΕΥΝΑΣ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, ISBN: 978-960-524-378-4 (Κωδικός Βιβλίου στον Εύδοξο: 22695091)*
- *Θεωρητική Μηχανική", Ι. Δ. Χατζηδημητρίου (2 Τεύχη):*

o *1.Νευτώνια μηχανική, Εκδόσεις Γιαχούδη, 2000, ISBN 960-7425-34-0, ISBN-13 978-960-7425-34-8*

o *2. Αναλυτική δυναμική. Ειδική θεωρία της σχετικότητας, Εκδόσεις Γιαχούδη, 2000,SBN 960-7425-35-9, ISBN-13 978-960-7425-35-5*

- *Τσίγκανος Κανάρης Εισαγωγή στη θεωρητική μηχανική, Έκδοση: 1η έκδ./2004, ΕΚΔΟΣΕΙΣ ΣΤΑΜΟΥΛΗ ΑΕ, ISBN: 978-960-91748-1-7, Κωδικός Βιβλίου στον Εύδοξο: 22744*

Επιπρόσθετη βιβλιογραφία:

- *http://ph204.edu.physics.uoc.gr/bibliography.php*
- *Herbert Goldstein (Author), Charles P. Poole Jr. (Author), John L. Safko, Classical Mechanics (3rd Edition), Pearson Education, Limited, Essex, ISBN-13: 978-0201657029*
- *L. D. Landau, E.M. Lifshitz, Mechanics, 3rd Edition, Elsevier, ISBN-13: 978-0750627689*

COURSE OUTLINE

(16) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_130**	**SEMESTER**	**1ST**
COURSE TITLE	**INTRODUCTION TO BIOSYSTEMS SCIENCE**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(17) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, is able

• to: understand what a system is and how we use this term in Science

• understand the dependence of conclusions about the behavior of a system on the constraints and assumptions on which its definition was based

• understand soil systems, soil composition, life, soil processes and symbiotic interactions

• Be aware of the updated theories of harmonic balance of biosystems.

• Approach each problem as a dynamic system problem.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of this course the student will have further developed the following skills (general skills):

• Ability to demonstrate knowledge and understanding of concepts and applications related to the living and abiotic environment as a whole
• Ability to demonstrate knowledge and understanding of concepts and applications related to the interactions of natural phenomena with biological systems
• Study skills needed for continuing professional development.
• Ability to interact with others in problems of an interdisciplinary nature.

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations, Decision making, Autonomous and team work,
Respect for the natural environment, Promotion of free, creative and inductive thinking

(18) SYLLABUS

What we define as a system. Conditions and Assumptions. Collaborative action and interdependence of the components of a system. Dynamic systems. The importance of system dynamics. The role of each department and the importance of synergy in the course of its changes. The cell. The organization. Categories of living organisms: Plants, species and categories of plants. Animals, and living organisms in general. Interactions with the abiotic environment. Aquatic systems. Factors affecting the system. Territorial systems. Soil composition, life and processes that take place in the soil. Atmosphere. The dynamics of the atmosphere and its effects. Plants, insects, earthworms and birds. Symbiotic interactions. Human intervention: The differentiation of biosystems due to construction, chemical and biological pollution and noise pollution of new technologies. Nature, human activities, economic reality, the organization of social life and social prosperity as interconnected components of a system. Mathematical simulation of systems. Research and updated theories of harmonic equilibrium of biosystems

Weeks 1 and 2: What we define as a system. Conditions and Assumptions. Collaborative action and interdependence of the components of a system. Dynamic systems. The importance of system dynamics. The role of each department and the importance of synergy in the course of its changes.
Week 3 Introduction to the Holobiont model - from the cell, to the community, to the ecosystem.
Week 4 Aquatic systems. Factors affecting the system
Week 5 Territorial systems. Soil composition, life and processes that take place in the soil
Week 6 Atmosphere. The dynamics of the atmosphere and its effects. Plants, insects, earthworms and birds. Symbiotic interactions.
Week 7 Water and soil utilization / management
Week 8 Land Recovery
Week 9 Introduction to the use of microorganisms for resource recovery
Week 10 Human intervention: The diversification of biosystems due to

construction, chemical and biological pollution and noise pollution of new technologies.
Week 11 Biodiversity loss, Deforestation, fragmentation, desertification, ecological and economic dimensions of biodiversity loss
Week 12 Nature, human activities, economic reality, organization of social life and social well-being as interrelated components of a system. Ways and techniques of application of biodiversity conservation in biosystems.
Week 13: Mathematical simulation of systems. Research and updated theories of harmonic equilibrium of biosystems

(19) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	***Activity*** / ***Semester workload*** Lectures: 39 Tutorials: 26 Projects and exams work: 40 Unguided study: 20 Course total: ***125***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written or oral final exam with physical presence or distance with or without participation in work during the semester. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. performed in the Greek language. For foreign language students (eg Erasmus students) conducted in English The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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Hilary eds. The Sage Handbook of Action Research Participative Inquiry and Practice (2nd edition). London, UK:

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COURSE OUTLINE

(21) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_150**	**SEMESTER**	**1ST**
COURSE TITLE	**GENERAL BIOLOGY**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(22) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon completion of this course students will be able to:

1. Understand and analyze basic concepts and principles of Biology
2. Know and understand the rules that govern the phenomenon of life (nature, origin, organization and chemistry of Life)
3. Know and analyze the structure and basic processes that characterize the eukaryotic and prokaryotic cell
4. Know and understand basic concepts related to metabolism, cellular respiration and photosynthesis
5. They know the basic characteristics that govern and concern the nature, the role and the structure of the genetic material
6. Know and understand the processes of the cell cycle, mitosis and reduction
7. Understand the processes of copying, transcribing and translating genetic material
8. Know and understand the basic principles of Mendelian theory and the chromosomal basis of heredity
9. Know basic knowledge about viruses

10. They know basic knowledge about Biotechnology
11. Investigate and locate accurate information and relevant educational material in the international and Greek literature

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Teamwork
- Respect for the natural environment
- Exercise criticism and self-criticism
- Promoting free, creative and inductive thinking

(23) SYLLABUS

1. Biology, Physics and Chemistry in the study of Life. Introduction.
2. Chemistry of living beings (chemical elements, chemical bonds in life, water)
3. Chemistry of living beings (macromolecules, origin of life),
4. Cell, (prokaryotic and eukaryotic cells and cellular organelles).
5. Cellular metabolism (energy flow, biological reactions (catalyst enzymes),
6. cellular respiration, factors that affect it, energy production).
7. Cell cycle and division (mitosis, reduction).
8. Basic doctrine of Biology and organization and sequences of cell genomes: non-DNA coding, organization of DNA into chromatin and chromosomes, nucleosomes, histones
9. Genetics (Mendel Laws, Extensions of Mendelian Inheritance).
10. Evolution (Darwinian theory, Neo-Darwinism, ontogeny and phylogeny, adaptation, evolution of species).
11. Architectural model of animals. Development (main development stages and mechanisms).
12. Principles Ecology
13. Classification and phylogeny.

Laboratory Part Description:

1. Laboratory safety rules, use of instruments.
2. Introduction to microscopy
3. Observation of microorganisms (preparations) under the microscope.
4. Observation of live natural sample microorganisms under the microscope.
5. Observation of mitosis and reduction preparations.

(24) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	***Semester workload***
Lectures	39
Laboratory	16
Writing short reports of laboratory exercises	25
Study hours. Literature survey, preparation for the laboratory exercises and the final examination	45
Course total	***125***

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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COURSE OUTLINE

(26) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_160**	**SEMESTER**	**1ST**
COURSE TITLE	**PLANT MORFOLOGY AND ANATOMY I**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. Knowledge of High School Biology is desirable
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(27) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

At the end of this course the student will be able to:

• to know the structure of the plant organism,

• understand how this structure serves all the functions performed within the plant organism,

• to be able to use the basic knowledge of plant anatomy and to use this knowledge in other cognitive subjects of Agriculture.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…

…….

At the end of this course the student will have further developed the following skills (general skills):

Ability to demonstrate knowledge and understanding of essential data, concepts, theories and applications related to Plant Morphology and Anatomy.
Ability to apply this knowledge and understanding to solving problems of a non-familiar nature.
Ability to adopt and apply methodology in solving non-familiar problems.
Study skills needed for continuing professional development.
Ability to interact with others in problems of an interdisciplinary nature.
Ability to work independently and in a team in an interdisciplinary environment.
Ability to promote free, creative and inductive thinking.

An additional goal is to be able to:
1. Autonomous Work
2. Teamwork
3. Decision Making
4. Work in an interdisciplinary environment

(28) SYLLABUS

The content of the course includes the following:
Plant cell:
• Basic elements of the plant cell structure.
Plant cell subcellular organelles
• Plant cell categories: Parenchymal. College. Sclerosis.
Plant tissues:
• Tissue categories of the plant body.
• Vegetable skin-accessories.
• Tissue ducts: wood and bark.
• Secretory cells and tissues.
Organization of the plant body:
The shoot: primary and secondary structure and growth.
• The root: primary and secondary structure and development.
• The structure of the leaf.
• The structure of the flower.
• Plant reproduction. Fruits & seeds.

LABORATORY EXERCISES
Plant organography: root, stem, leaves, flowers, fruits.
• The plant cell: nucleus, plastids, dead cell inclusions.
• Skin: nephroid and alteroid mouths.
Tissues: Periderm, Pancreatic, supportive, conduit tissue.
• Anatomy of stem, leaf, root.
• Flowers-inflorescences. Categories of fruits

(29) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice,*	

Activity	***Semester workload***
Lectures	39
Labs	26

fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Unguided study: 57 Final Exams: 3 Course total: ***125***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written or oral final exam with physical presence or online with or without contribution of project work during the semester The evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(30) ATTACHED BIBLIOGRAPHY (IN GREEK)

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- *Dickison W.C. (2000) Integrative Plant Anatomy. Academic Press.*
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COURSE OUTLINE

(31) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_200**	**SEMESTER**	**2ND**
COURSE TITLE	**GENERAL AGRICULTURE**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background and Scientific Area
PREREQUISITE COURSES:	There are no prerequisite courses. it is desirable, however that they have obtained a pass grade in the course of "introduction to the science of biosystems"
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(32) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, is able

• Knows the principles of crop production with emphasis on large crops both in theory and in practice.

• To have acquired basic knowledge that will help him in the coming semesters to evaluate and select the production of competitive products, and the implementation of appropriate agricultural practices for the sustainable management of the rural environment.instrumental methods of chemical analysis)

• evaluates the results of a chemical analysis

• handles organology

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
	Respect for the natural environment

Decision-making *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *……..*

At the end of this course the student will have further developed the following skills (general skills):

• Ability to demonstrate knowledge and understanding of concepts and applications related to agricultural crops.
• Ability to demonstrate knowledge and understanding of factors that are systematically related to efficient and sustainable agriculture
• Study skills needed for continuing professional development.
• Ability to interact with others in problems of an interdisciplinary nature.

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations, Decision making, Autonomous and team work,
Respect for the natural environment, Promotion of free, creative and inductive thinking

(33) SYLLABUS

Effects of the aerial environment on the growth and yields of large crops
1.Solar radiation. Effects of solar radiation on crop productivity and possibilities for interventions to improve crop production.
2. Temperature. Effect on biological processes of plants. Extreme temperature damage General effects of temperatures in Georgia. Characterization of plants based on their thermal requirements. Possibilities of interventions to improve crop production.
3. Atmospheric Humidity. Rainfall. Time distribution is important for agriculture. Rainfall efficiency and possibilities of interventions to improve crop production.
4. Wind Direct and indirect effects of wind on plants and possibilities of interventions to improve crop production.
5. Evaporation capacity of the atmosphere. Effect on crop production. Water consumption of the plantation and irrigation planning.
6. Concentration of carbon dioxide. Impact on crop production and possibilities of interventions to improve crop production.
7. Photobiology. Effect of wavelength on plant growth and protection from enemies
II. Effects of variables of the soil environment on development and yields of large crops.
8. Texture, structure, porosity, temperature and water content, chemical and biological characteristics of the soil. Ways to improve crops.
9. Interventions in the territorial environment. Fertilization: inorganic, organic, green fertilization.
10. Soil treatment. Types and objectives. Effect on soil and plant characteristics.
11. Soil cultivation. Intervention time. Cultivation methods (intensive cultivation, reduced cultivation, soil uncultivation).
12. Crop rotation. Objectives and basic principles. Monoculture, set-aside, crop

rotation in arid and irrigated areas, sowing and intermediate crops.
13. Production systems

The laboratory exercises in the course are group. They will be made by the students in the field of the Agriculture Laboratory by installing individual fields with large cultivated plants, monitoring and receiving observations of the growth of the plants throughout the semester. They also include a demonstration of cultivation work with cultivation machinery in the field and attendance of laboratory exercises related to plant development and application of agricultural techniques. Finally, each group of students will deliver assignments based on laboratory exercises.

(34) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face deliveries.
Laboratory exercises in General and Analytical Chemistry</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>26</td></tr>
<tr><td>Writing short reports of laboratory exercises- Exams</td><td>40</td></tr>
<tr><td>Study hours and preparation for the laboratory exercises and the final examination</td><td>20</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(35) ATTACHED BIBLIOGRAPHY (In Greek)

Προτεινόμενη Βιβλιογραφία :
Α. Καραμάνος. Γενική Γεωργία. Αρχές Φυτικής Παραγωγής στις αροτραίες Καλλιέργειες, Εκδόσεις ΠΑΠΑΖΗΣΗΣ, 2011, ΑΘΗΝΑ, Κωδικός Ευδόξου 5778

COURSE OUTLINE

(36) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_210**	**SEMESTER**	**2nd**
COURSE TITLE	**MATHEMATICS II**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. There are no prerequisite courses. However, students must have a good knowledge of the differential and integral calculus and functions of a variable.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(37) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the course Mathematics II is a tool for students of the Department of Biosystems Science and Agricultural Engineering which aims to introduce and familiarize them with the concepts and methodologies of applied mathematics for engineers who are a tool in their science and especially in the regions. of the differential-integral calculus of functions of many variables and vector analysis. This knowledge is necessary and will be used in many subsequent lessons.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

Working in an interdisciplinary environment *Production of new research ideas*	*……* *Others…* *…….*

At the end of the course the student will have acquired the ability to use the mathematical methods effectively in the next courses in his / her studies at EVGM as well as in related problems of EVGM. Additional goal is to be able to:1. Autonomous Work
2. Teamwork
3. Decision Making
4. Critical analytical and synthetic thinking for solving mathematical problems in Agricultural Engineering

(38) SYLLABUS

Differential Calculus of Multivariate Functions, Vector Analysis and Integral Calculus of Multivariate Functions:
1. Functions of many variables (Cartesian, cylindrical and spherical coordinates in space. Second degree surfaces)
2. Some 1st and higher order derivatives (physical importance, production rules)
3. Double integrals.
4. Triple integrals.
5. Curved integrals.
6. Vector functions.
7. Sequences. Rows and dynamos.
8. Ordinary differential equations. Ordinary first order differential equations: Separate variables
9. Ordinary first order differential equations: Bernulli equation, linear equations.
10. Linear ordinary higher order differential equations with constant coefficients.
11. Linear ordinary higher order differential equations with constant coefficients.
12. Systems of differential equations.
13. Initial and limit value problems.

(39) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	39
Tutorials	26
Unguided study	57
Final Exams	3
Course total	***125***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions,*	Written or oral final exam with physical presence or online with or without contribution of project work during the semester The evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of

open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(40) ATTACHED BIBLIOGRAPHY (IN GREEK)

- BrandL., «Μαθηματική Ανάλυση», Εκδόσεις Ελληνικής Μαθηματικής Εταιρίας, Αθήνα, 1984
- FinneyR.L., WeirM.D. GiordanoF.R, «Απειροστικός Λογισμός», Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο, 2009
- Αθανασιάδης Α.Γ., «Διαφορικός και ολοκληρωτικός λογισμός συναρτήσεων μιας μεταβλητής και Εισαγωγή στην αναλυτική γεωμετρία», Εκδόσεις Τζιόλα, Θεσσαλονίκη, 2001
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- Βλάχος Λ., «Διαφορικός λογισμός πολλών μεταβλητών», Εκδόσεις Τζιόλα, Θεσσαλονίκη, 2008
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- Καρανικόλας Ν.Δ., «Εισαγωγή στο διαφορικό λογισμό συναρτήσεων πολλών μεταβλητών», Εκδόσεις Ζήτη, Θεσσαλονίκη, 2004
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- Τσιάνος Β., «Ανώτερα μαθηματικά για μηχανικούς», Εκδόσεις Τζιόλα, Θεσσαλονίκη, 2005

COURSE OUTLINE

(41) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_220**	**SEMESTER**	**1st**
COURSE TITLE	**GENERAL AND INORGANIC CHEMISTRY**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no strict prerequisites but students must have been taught General and Inorganic Chemistry and General Biology and have successfully completed the respective workshops..
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(42) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, is able to:

• understands the chemical formulas and nomenclature of organic chemical compounds
• knows the main classes of organic compounds and their basic reactions
• explains the structure, stability and activity of aromatic compounds using the theory of resonance
• knows the chemical composition and structure of basic biomolecules (carbohydrates, proteins, lipids, nucleic acids)
• knows the basic laboratory techniques of Organic Chemistry

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment

Decision-making	*Showing social, professional and ethical responsibility and*
Working independently	*sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of this course the student will have further developed the following skills (general skills):

• Ability to demonstrate knowledge and understanding of concepts and applications related to Organic Chemistry
• Ability to demonstrate knowledge and understanding of concepts and applications related to the structure of biomolecules
• Study skills needed for continuing professional development.
• Ability to interact with others on problems of a chemical or interdisciplinary nature.

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations, Decision making, Autonomous and team work,
Respect for the natural environment, Exercise criticism and self-criticism

(43) SYLLABUS

1. Introduction to Organic Chemistry and Organic Compounds
2. Classification and Nomenclature of Organic Compounds
3. Hybridization in Organic Compounds
4. Isomerism and Stereochemistry
5. Organic Reaction Mechanisms
6. Aliphatic Hydrocarbons
7. Alkyl halides
8. Alcohols, Aldehydes, Ketones and derivatives of carbonyl compounds
9. Carboxylic Acids and Derivatives
10. Isoprenoid compounds
11. Coordination-Marital phenomenon, Aromatic compounds and derivatives
12. Biomolecules: Carbohydrates, Sugars, Lipids, Amino Acids, Peptides and Proteins
13. Biomolecules: Nucleotides and Nucleic Acids Heterocyclic compounds of plant and animal origin

Laboratory Exercises

1. Introduction to the Laboratory-Safety and hygiene rules
2. Basic Laboratory Techniques
3. Recrystallization, Melting point
4. Thin layer chromatography (T.L.C.)
5. Hydrocarbon reactions
6. Alcohol reactions
7. Detection of carbonyl groups
8. Detection and properties of amino acids
9. Physicochemical properties of proteins
10. Spectrophotometry-Quantification of proteins
11. Properties of mono- and disaccharides
12. Detection of carbohydrates
13. Determination of pI of glycine

(44) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face deliveries.
Laboratory exercises in Organic Chemistry</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>26</td></tr>
<tr><td>Writing short reports of laboratory exercises</td><td>13</td></tr>
<tr><td>Final Exams</td><td>3</td></tr>
<tr><td>Study hours and preparation for the laboratory exercises and the final examination</td><td>44</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(45) ATTACHED BIBLIOGRAPHY

-Suggested bibliography :

1. J. McMurry, 2017, Οργανική Χημεία, Πανεπιστημιακές Εκδόσεις Κρήτης

2. Νικόλαος Ανδρικόπουλος, 2019, Συνοπτική Γενική & Ειδική Οργανική Χημεία

3. Μαυρομούστακος Θωμάς, Τσέλιος Θεόδωρος, Παπακωνσταντίνου Κωνσταντίνος, 2014, Θεμελιώδεις Αρχές Οργανικής Χημείας, Εκδόσεις ΣΥΜΜΕΤΡΙΑ

4. Carret/Denniston/Topping, 2000, Αρχές και Εφαρμογές της Ανοργάνου , Οργανικής και Βιολογικής Χημείας, Εκδόσεις BROKEN HILL

5.Βασική Οργανική Χημεία, Σπηλιόπουλος Ιωακείμ, 1η Έκδοση, 2008, Εκδόσεις Σταμούλη Α.Ε.

6. Οργανική Χημεία L. G. Wade, JR., 7η Έκδοση, Εκδόσεις Τζιόλα

7.Επίτομη Οργανική Χημεία, Βάρβογλης Αναστάσιος Γ., 1η Έκδοση 2005, Εκδόσεις Ζήτη Πελαγία & Σια Ι.Κ.Ε.

-Other sources

- *The Journal of Organic Chemistry, (ACS Publications) https://pubs.acs.org/journal/joceah*

- *Biochemistry, (ACS Publications) https://pubs.acs.org/journal/bichaw*
- *https://www.organic-chemistry.org/*
- *https://en.wikiversity.org/wiki/Portal:Organic_chemistry*
- *https://www.khanacademy.org/science/organic-chemistry/stereochemistry-topic*

COURSE OUTLINE

(46) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_230**	**SEMESTER**	**2nd**
COURSE TITLE	**BASIC PRINCIPLES OF INFORMATION TECHNOLOGY AND PROGRAMMING I**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	
Tutorials	0	
Laboratory	3	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. However, students must have a satisfactory knowledge of Mathematics of the General Lyceum and familiarity with the computer environment.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek / English to the extent required by the nature of the course .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(47) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the course BASIC PRINCIPLES OF INFORMATION TECHNOLOGY AND PROGRAMMING is a background object and at the same time a tool for the students of the Department of Biosystems Science and Agricultural Engineering which aims to introduce and familiarize them with the are essential tools in their science This knowledge is necessary because it is used in many subsequent courses which are related to the Intelligent Agriculture of the Future, Precision Agriculture etc.

Upon successful completion of the course the student will be able to:

• distinguish the structural elements of a computer and choose the composition of a computer system that meets the needs of its scientific field

• utilize the capabilities of the operating system (Operating System) of a computer and perform configurations,

• understand the basic principles of programming, algorithmic structures and techniques of designing and developing a program,

• convert algorithms into structures and, using the commands of a programming language, compose

a program that solves a specific problem using PC

• be able to install, configure and use software systems for data processing and analysis, evaluation of results and decision making in matters of the scientific field. To acquire the necessary knowledge to search for information

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of the course the student will have acquired the ability to use effectively the PC and basic programming methods as knowledge of infrastructure in the next courses in his studies at EVGM. Additional goal is to be able to:

1. Autonomous Work
2. Teamwork
3. Decision Making
4. Work in an interdisciplinary environment
5. Search, analysis and synthesis of data and information, using the necessary information technologies

(48) SYLLABUS

1. Introduction to computer use. Evolution of computers, processors and architectures
2. Data storage and data handling, information creation
3. Data representation. Representation of numbers
4. Modern computer architecture, structural / functional elements
5. Registrars. Memory items, Memory addresses. Input, Output and storage devices.
6. Relational Database Systems (RDBMS)
7. Computer Software: Operating Systems. Evolution of operating systems.
8. Application Architecture and Software.
9. Computer Networks, Internet
10. Algorithms and Programming Languages. Introduction to structured and object-oriented programming
11. Data types. Variables. Stable. Numerical, relational and logical operators.
12. Input / Output Methods. Commands (simple and complex). Built-in and user-defined functions.
13. Conditions. Decision structures, iteration structures, table handling.
14. Subroutines
15. Debugging

(49) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater and mainly in the Computer Center, Lectures using electronic means which concern the theory, in exercises in the PC for applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).

TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Combined Final Exam with the use of PC in the Greek language

Activity	***Semester workload***
Lectures	39
Tutorials	26
Unguided study	57
Final Exams	3
Course total	***125***

(50) ATTACHED BIBLIOGRAPHY

- KnuthD.E., «Η Τέχνη του Προγραμματισμού», Μετ. Σ. Σουραβλάς, Εκδόσεις Τζιόλα, Θεσσαλονίκη, 2009
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- Lawrence Leemis. Learning Base R. Lightning Source, 2016. ISBN 978-0-9829174-8-0
- Vikram Dayal. An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing. Springer, 2015. ISBN 978-81-322-2340-5

COURSE OUTLINE

(51) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_240**	**SEMESTER**	**2nd**
COURSE TITLE	**INTRODUCTION TO AGRICULTURAL ENGINEERING SCIENCE**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no strictly prerequisite courses but for a better understanding of this course, students should have attended the first semester courses
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(52) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, is able to:

• to: understand what Agricultural Engineering is and to have an overview of what this science is about.

• understand the correlation of Agricultural Engineering with the fundamental sciences

• understand the territorial systems, the main parameters that affect them and the types and methods of human intervention

• To know the modern agricultural machinery and their fields of use

• To be able to combine knowledge in the field of Agricultural Engineering with those of Biosystems Science.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Project planning and management

Respect for difference and multiculturalism

Adapting to new situations	*Respect for the natural environment*
Decision-making	*Showing social, professional and ethical responsibility and*
Working independently	*sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of this course the student will have further developed the following skills (general skills):

• Ability to demonstrate knowledge and understanding of concepts related to Agricultural Engineering and its sustainable applications.
• Ability to demonstrate knowledge and understanding of how Agricultural Engineering contributes to the utilization of natural resources and the positive interventions that can be achieved through its implementation
• Study skills needed for continuing professional development.
• Ability to interact with others in problems of an interdisciplinary nature.
• Ability to challenge the established but also to utilize existing knowledge in a direction of continuous creative research and reflection.

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies, Adaptation to new situations, Decision making, Autonomous and team work, Respect for the natural environment, Promotion of free, creative and inductive thinking

(53) SYLLABUS

General principles, introductory description of the following:
Classification of crops. Cultivation systems for the main climatic and soil conditions. Production strategies. Modern cultivation techniques. Cultivation and soil management practices. Seeds and sowing practices. Irrigation and fertilizer planning. Plant protection measures. Harvest and after harvest. Principles and practices of dry land. Pruning and arranging the soil before cultivation. Engineering of agricultural holdings, Classification of agricultural machines. Primary and secondary plowing tools. Plowing methods. Sowing machines, planting and transplanting equipment. Manual and motorized plant protection equipment. Manual and motorized weed control. Manual and motorized harvesting tools. Excavators. Manure dispersion systems, crushers, chainsaws, harvesters and threshers. Loading and transporting machines. Development and utilization of appropriate tools and equipment. Efficient use of agricultural machinery
Water collection and retention. Ways and mechanisms of irrigation. Aerospace, Hydroponics and greenhouse units. Fruit storage, storage and processing. Utilization of agricultural residues.

Week 1 Crop classification. Cultivation systems for the main climatic and soil conditions.
Week 2: Production strategies. Modern cultivation techniques
Week 3 Cultivation and soil management practices. Seeds and sowing practices.
Week 4 Irrigation and fertilizer planning. Plant protection measures. Harvest and after harvest.
Week 5 Principles and practices of dry land. Pruning and arranging the soil before cultivation.
Week 6 Farm Engineering, Agricultural Machinery Classification ..
Week 7 Primary and secondary plowing tools. Plowing methods. Sowing machines, planting and transplanting equipment. Manual and motorized plant protection equipment.
Week 8 Manual and motor weed control. Manual and motorized harvesting tools. Excavators. Manure dispersal systems, crushers, chainsaws, harvesters and threshers. Loading and transporting machines.
Week 9 Development and utilization of appropriate tools and equipment. Efficient use of agricultural machinery
Week 10 Water collection and retention. Ways and mechanisms of irrigation.

Week 11 Aerospace, Hydroponics and Greenhouse Units
Week 12 Fruit storage, storage and processing.
Week 13: Utilization of agricultural residues. Use of biological processes for energy production.

(54) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	***Activity*** — ***Semester workload*** Lectures — 39 Tutorials — 26 Unguided study — 20 Coursework and Exams — 40 Course total — ***125***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written or oral final exam with physical presence or online with or without contribution of project work during the semester The evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(55) ATTACHED BIBLIOGRAPHY (IN GREEK)

- Κ. ΤΣΑΤΣΑΡΕΛΗΣ, ΑΡΧΕΣ ΜΗΧΑΝΙΚΗΣ ΚΑΤΕΡΓΑΣΙΑΣ ΤΟΥ ΕΔΑΦΟΥΣ & ΣΠΟΡΑΣ, Σ. ΓΙΑΧΟΥΔΗ, 2000 ΘΕΣ/ΚΗ , 7972
- Α. ΚΑΡΑΜΑΝΟΣ ΑΡΧΕΣ ΦΥΤΙΚΗΣ ΠΑΡΑΓΩΓΗΣ ΣΤΙΣ ΑΡΟΤΡΑΙΕΣ ΚΑΛΛΙΕΡΓΕΙΕΣ, ΠΑΠΑΖΗΣΗΣ, 2011 ΑΘΗΝΑ 5778
- https://www.ebooks4greeks.gr/gewrgikh-mhxanikh

COURSE OUTLINE

(56) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_250**	**SEMESTER**	**2ND**
COURSE TITLE	**GENERAL ARBORICULTURE**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background and Scientific Area
PREREQUISITE COURSES:	There are no prerequisite courses. it is desirable, however that they have obtained a pass grade in the course of "introduction to the science of biosystems"
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(57) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The student, at the end of the relevant Learning Process, must be familiar
• on a theoretical and practical level with the needs of the tree for vegetation and fruiting,
• with the interactions of endogenous with exogenous factors, and the appropriate culture interventions.
Emphasis is placed on tree characteristics of the basic arboricultural species for the country

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……

Production of new research ideas	*Others…* *…….*

At the end of this course the student will have further developed the following skills (general skills):

- Study skills needed for continuing professional development.
- Ability to interact with others in problems of an interdisciplinary nature.

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations, Decision making, Autonomous and team work,
Respect for the natural environment, Promotion of free, creative and inductive thinking

(58) SYLLABUS

The production of arboricultural products worldwide and nationally. The fruit tree and its organs. Propagation of fruit trees. Subjects of fruit trees. Way of fruiting of fruit trees. Lethargy. Fruiting. Fruit growth and ripening. Growth hormones and regulators. Nutrition of fruit trees. The use of water by fruit trees. Pruning. Productivity of fruit trees. Orchard installation. Frost protection.

1. Introduction - Basic elements of fruit tree arboriculture
2. Fruit tree parts and their basic functions
3. Stem and roots of fruit trees
4. Vaccination of fruit trees
5. Leaf and bud of fruit trees, Leaf operation, cultivation techniques and productivity of fruit trees.
7. i. Pruning of fruit trees. Youth and productive life of fruit trees. Fruit tree bud lethargy
8. Pollination, fertilization and fruiting of fruit trees
9. Fruit growth in various species of fruit trees. Fruits ripening of fruit trees. Principles of fruit preservation of different species.
10. Hormones and application of growth regulators in fruit trees. Fruit tree propagation species (excluding grafting, section 4)
11. Design and installation of an orchard
12. Frost and Frost protection of fruit trees. Irrigation of fruit trees
13. Nutrition and fertilization of fruit trees. Exercises

The purpose of the lab work is to familiarize students with the recognition of the main cultivated species for the country, as well as the peculiarities in the way of their vegetation and fruiting .throughout the semester. They also include a demonstration of cultivation work with cultivation machinery in the field and attendance of laboratory exercises related to plant development and application of agricultural techniques. Finally, each group of students will deliver assignments based on laboratory exercises.

(59) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face deliveries. Laboratory exercises in General and Analytical Chemistry

<table>
<tr><td></td><td></td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>26</td></tr>
<tr><td>Writing short reports of laboratory exercises- Exams</td><td>40</td></tr>
<tr><td>Study hours and preparation for the laboratory exercises and the final examination</td><td>20</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(60) ATTACHED BIBLIOGRAPHY (In Greek)

(61) 1. Γενική Δενδροκομία, 1997. Κ. Ποντίκης
(62) 2. Γενική και Ειδική Δενδροκομία , 2010. Μ. Βασιλακάκης.
(63)
(64) -Συναφή επιστημονικά περιοδικά:
(65) 1. Γενική και Ειδική Δενδροκομία , 2010. Μ. Βασιλακάκης.
(66) 2. Δενδρώδεις Καλλιέργειες, 1991. Ε.Μ. Σφακιωτάκης
(67) 3. Πολλαπλασιασμός Καρποφόρων Δένδρων και Θάμνων, 1994. Κ. Ποντίκης

COURSE OUTLINE

(68) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_300**	**SEMESTER**	**3RD**
COURSE TITLE	**MICROBIOLOGY**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(69) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The objectives of this course are:
• To give students the concepts and importance of Microbiology.
• Introduce students to the nutrition and metabolism of microorganisms.
• Explain to students the theory and application of microbial growth.
• Explain to students the gene expression and principles of microbial ecology.
• Introduce students to the principles of virology.
• Explain the preparation of nutrient substrates and the concept of clean crops.
• Introduce students to Gram staining and microbial control of water.

Upon completion of the course students should be able to:

• Understand the interactions of plants and microorganisms and in particular such as symbiotic nitrogen fixation.
• Understand the importance of microorganisms, their nutrition and metabolism.
• Understand the principles of molecular microbiology.

• Understand gene expression in prokaryotic organisms.
• Understand the role of viruses and understand viral replication and viral diversity.
• Understand the principles of microbial genetics.
• Be able to work in a microbiology laboratory under aseptic conditions.
• Be able to prepare nutrient substrates.
• Be able to perform microbial control of water.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(70) SYLLABUS

LESSON 1 Introductory concepts - Macromolecules of microorganisms
LESSON 2 Microscopy and cell morphology. Cell membranes and cell walls.
LESSON 3 Movement of microorganisms. Surface structures and inclusions of prokaryotes.
LESSON 4 Nutrition and laboratory crops.
LESSON 5 Metabolism of microorganisms.
LESSON 6 Theory and practice of microbial growth. Environmental effects on microbial growth.
LESSON 7 Overview of genes and gene expression. RNA synthesis and processing.
LESSON 8 Regulation of gene expression.
LESSON 9 Microbial evolution and systematic.
LESSON 10 Principles of Microbial Ecology.
LESSON 11 Characterization of microbial populations and communities by methods of classical microbiology and molecular microbial ecology.
LESSON 12 Mechanisms of transfer and exchange of genetic material. Transferable items. Plasmids.
LESSON 13 Viruses and viruses, viral proliferation, viral diversity.

LABORATORY EXERCISES
Exercise 1; Introduction to the microbiology laboratory
Exercise 2: Preparation and sterilization of nutrients
Exercise 3: Aseptic working methods in microbiology
Exercise 4: Determine the number of bacteria by sequential dilutions
Exercise 5: Clean cultures - growth of bacteria in liquid nutrients
Exercise 6: Staining and microscopic examination of microorganisms
Exercise 7: Microbiological control of water
Exercise 8: Staining by Gram

(71) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND	• Use of ICT (power point) in Teaching

<table>
<tr><td>COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>16</td></tr>
<tr><td>Writing short reports of laboratory exercises</td><td>25</td></tr>
<tr><td>Study hours. Literature survey, preparation for the laboratory exercises and the final examination</td><td>45</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(72) ATTACHED BIBLIOGRAPHY

- *"Brock Βιολογία των μικροοργανισμών" Τόμος Α'., MADIGAN,MARTINKO*
- *Μικροβιολογία & Μικροβιακή Τεχνολογία, Γεώργιος Αγγελής*
- *Microbial Ecology: Fundamentals and Applications. (Atlas, R.M. and Bartha, R.)*
- *Environmental Microbiology (Varnan, A.H. and Evans, M.G.)*
- *Manual of Environmental Microbiology (Hurst, C.J., Knudsen, G.R., McInerney, Stetzenbach, L.D. and Walter, M.V.)*
- *Brock Biology of microorganisms. (Madigan, M.T., Martinko, J.M. and Parker, J.)*
- *Microbes and man. (Postgate, J.)*
- *The outer reaches of life (Postgate, J.)*
- *Power unseen. How microbes rule the world (Dixon, B.)*
- *ΕΡΓΑΣΤΗΡΙΑΚΕΣ ΑΣΚΗΣΕΙΣ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗΣ ΜΙΚΡΟΒΙΟΛΟΓΙΑΣ , Τσιάμης Γεώργιος*

Other sources:

- *Nature*
- *Science*
- *Trends in Microbiology (TIM)*
- *Trends in Biotechnology (TIBTECH)*
- *Proceedings of National Academy of Sciences, USA (PNAS)*
- *Journal of Bacteriology*
- *Applied and Environmental Microbiology*
- *New Scientist*
- *Scientific American*

The ISME Journal (International Society for Microbial Ecology)e

COURSE OUTLINE

(73) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_310**	**SEMESTER**	**3RD**
COURSE TITLE	**COMPUTER ASSISTED TECNICAL DRAWING**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	
Tutorials	0	
Laboratory	3	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(74) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

• Acquisition of knowledge for the principles of technical design

• Learning and using design software

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Search, analysis and synthesis of data and information, using the necessary technologies
Decision making
Autonomous work
Teamwork
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(75) SYLLABUS

- Apeikónisi trisdiástaton schimáton se dýo diastáseis – Chrísi orgánon schedíasis – Vasikés archés schediasmoú.
- Chrísi trigónou gia schediasmó – Schediasmós geometrikón schimáton.
- Chrísi diavíti – Schediasmós geometrikón schimáton.
- Perigrafí kátopsis – Schediasmós kátopsis (molývi).
- Schediasmós ypó klímaka – Schediasmós kátopsis se 1/50 (molývi).
- Schediasmós kátopsis ypó klímaka 1/100 (meláni).
- Schediasmó kátopsis ypó klímaka (meláni).
- Perigrafí tomís – Schediasmós tomís.
- Schediasmós kátopsis – tomís 1:100 (molývi).
- Schediasmó kátopsis – tomís ypó klímaka (molývi).
- Schediasmós kátopsis – tomís ypó klímaka (meláni).
- Schediasmós kátopsis – tomís ypó klímaka (meláni).
- Schediasmós leptoméreias.

CAD

- Chrísi ilektronikoú ypologistí
- Emváthynsi sto schediastikó prógramma CAD
- Vasikés archés schedíasis se CAD (schetikés kai apólytes syntetagménes, dekadiká, diagrafí, zoom, save, print)
- Entolés schedíasis se CAD (line, rectangular, circle, object snap, move, copy, offset, hatch, trim, explode, divide, join, text, dimlinear, ddim)

Show more
1030/5000

- Display of 3D shapes in two dimensions - Use of drawing tools - Basic design principles.
- Using a triangle for design - Designing geometric shapes.
- Use of diabetes - Design of geometric shapes.
- Floor plan description - Floor plan design (pencil).
- Scale drawing - Floor plan drawing in 1/50 (pencil).
- Floor plan design at 1/100 scale (ink).
- Scale floor plan design (ink).
- Section description - Section design.
- Plan of plan - section 1: 100 (pencil).
- Layout plan - section in scale (pencil).
- Floor plan design - section under scale (ink).
- Floor plan design - section under scale (ink).
- Detail design.

CAD

- Computer use
- Deepening in the CAD design program
- Basic design principles in CAD (relevant and absolute coordinates, decimal, delete, zoom, save, print)
- Design commands in CAD (line, rectangular, circle, object snap, move, copy, offset, hatch, trim, explode, divide, join, text, dimlinear, ddim)

(76) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	***Activity*** / ***Semester workload*** Lectures: 26 Laboratory: 39 UNGUIDED STUDY: 20 Study hours. Literature survey'EXAMS: 40 Course total: ***125***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them. 2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(77) ATTACHED BIBLIOGRAPHY

- *1. Κάππος Γ., (2017). Δουλέψτε με το AUTOCAD 2017, Αθήνα: Κλειδάριθμος.*
- *2. Κάππος Γ., (2008). 3Δ Τοπογραφικά και Αρχιτεκτονικά Παραδείγματα στο AUTOCAD, Αθήνα: Κλειδάριθμος.*

- *3. Μουρούτσος Σ., Μαλλιάρης Γ., (2016) Τεχνικό Σχέδιο, 3η Έκδοση, Αθήνα: Τσότρας.*
- *4. Σαράφης Η., Τσεμπεκλής Σ., Καζανίδης Ο. (2016) Τεχνικό Σχέδιο με AUTOCAD σε Απλά Αυτοτελή Μαθήματα,*

COURSE OUTLINE

(78) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_320**	**SEMESTER**	**3RD**
COURSE TITLE	**STATISTICS**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(79) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

At the end of this course the student should know the basic principles of probability theory and statistics. It should also be able to apply these principles to problems relating to environmental applications.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

At the end of this course the student will have further developed the following skills:
1. Ability to understand the basic concepts and methods.
2. Ability to apply them.
3. Search, analysis and synthesis of data and information, using the necessary technologies
4. Decision making
5. Autonomous work

(80) SYLLABUS

1. Introduction to statistical science and methodology.
2. Probabilities / Distributions. The normal distribution
3. How do I find out if a set of measurements follows the normal distribution?
4. Statistical tests I: t-student distribution, t-test for a population
5. Statistical tests II: Comparison of two populations [Independent samples t-test]
6. Statistical tests III: t-test for dependent samples [Paired samples t-test.
7. Statistical tests IV: One-Way ANOVA [One-Way ANOVA]
8. Linear regression (+ laboratory).
9. Applications of Statistics I in Biosystems (+ laboratory).
10,11,12.Applications of Statistics II in Agriculture (+ laboratory).
13 Summary

(81) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face teaching, Experiential activities, Laboratory training</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>UNGUIDED STUDY</td><td>46</td></tr><tr><td>Study hours. Literature survey’EXAMS</td><td>40</td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the</td></tr>
</table>

	composition of the dynamics and the needs of the audience. 3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(82) ATTACHED BIBLIOGRAPHY

- Kolmogorov, A. N. (1956). Foundations of the Theory of Probability. Chelsey Publishing Company, New York.
- Κολυβά-Μαχαίρα, Φ. & Μπόρα-Σέντα, Ε. (2013). Στατιστική: Θεωρία και Εφαρμογές. Εκδόσεις Ζήτη, Θεσσαλονίκη.
- Κούτρας, Μ. (2004). Εισαγωγή στις Πιθανότητες, Θεωρία και Εφαρμογές, 2η Έκδοση, Μέρος Ι. Εκδόσεις Σταμούλη.
- Lehmann, E. L. (1983). Theory of Point Estimation. John Wiley and sons, Inc., New York.
- Rao, C. R. (2008). Linear Statistical Inference and its Applications, 2nd edition. Wiley Series on Probability and Statistics
- Snedecor, G. W. & Cochran, W. G. (1989). Statistical Methods, 8th edition. Ames, Iowa: Blackwell Publishing Professional.

COURSE OUTLINE

(83) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_330**	**SEMESTER**	**3rd**
COURSE TITLE	**Soil science**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(84) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course material aims at acquiring knowledge and understanding the basic concepts of the soil. The aim is to understand that soil is a means of plant growth, determines the possibility of agricultural development of an area and participates in geomorphological and hydrological processes and is not an independent natural system. Therefore, its relationship with the environment is important to understand

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…

.....

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(85) SYLLABUS

Basic concepts of reference systems and coordinates. Definition of altitude and altitude difference. Definition of different height systems. Instruments and methods of measuring angles. The theodolite. Measurement of horizontal and vertical angles. Instruments and methods for measuring distances. Range and accuracy of electromagnetic instruments. Sources of errors. Calibration data for distance measuring instruments. Instruments and methods for determining altitudes and altitude differences. Algorithm for calculating altitudes and altitude differences. The problem of soil erosion in Greece. Types of soil erosion. Corrosion mechanisms. Factors affecting accelerated corrosion. General equation of soil loss. Anti-corrosion soil treatment systems. Ground cover as a protection measure. Soil conditioners for corrosion protection of soils. The ravine erosion. Measures to prevent torrents. General guidelines for corrosion protection measures.

(86) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face teaching, Experiential activities, Laboratory training</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
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The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>UNGUIDED STUDY</td><td>30</td></tr><tr><td>Study hours. Literature survey</td><td>56</td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in</td></tr>
</table>

	English

(87) ATTACHED BIBLIOGRAPHY

Εδαφολογία. 2008. Κυρ. Παναγιωτόπουλος, Εκδόσεις: Άγις- Σάββας Δ. Γαρταγάνης, Θεσ/νικη

COURSE OUTLINE

(88) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_350**	**SEMESTER**	**3RD**
COURSE TITLE	**BIOCHEMISTRY**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(89) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is to first introduce students to the basic characteristics of the structure and the biological role of the most important categories of biomolecules found in prokaryotic and eukaryotic organisms. In addition, data on the properties and mechanisms of action of enzymes, as well as the role of coenzymes and additive groups in enzyme catalysis are included, while the chapter on enzyme catalysis closes with the presentation of data on the kinetics of simple enzyme reactions. Finally, students are introduced to the principles and basic biochemical processes of intermediate metabolism. In more detail, important biochemical processes are presented that refer to the metabolism of the most important categories of biomolecules, which include carbohydrates, lipids, amino acids and nucleotides.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and

Working independently	*sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(90) SYLLABUS

Lesson 1. Macromolecules of living organisms and their building blocks.
Lesson 2 Carbohydrates - Nucleotides and Nucleic Acids.
Lesson 3 Amino Acids and Proteins & Lipids.
Lesson 4 Biological Membranes.
Lesson 5 Enzymes, properties, role of enzymes.
Lesson 6 Mechanisms of Enzyme catalysis.
Lesson 7 Coenzymes and Additive groups.
Lesson 8 Elements of kinetics of enzymatic reactions.
Lesson 9 Intermediate metabolism. Lesson 13 Introduction to metabolism.
Lesson 10 Bioenergy.
Lesson 11 Carbohydrate metabolism.
Lesson 12 Lipid metabolism.
Lesson 13 Amino acid metabolism & Nucleotide metabolism.
Laboratory exercises:
1. Preparation of solutions.
2. Chromatographic separations of proteins.
3. Photometry.
4. Determination of total Bradford protein concentration.
5. Centrifugation.
6. Electrophoresis.

(91) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face teaching, Experiential activities, Laboratory training</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Laboratory</td><td>12</td></tr><tr><td>UNGUIDED STUDY</td><td>32</td></tr><tr><td>Study hours. Literature survey</td><td>42</td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have</td></tr>
</table>

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	completed all the laboratories and have been successfully examined in them. 2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(92) ATTACHED BIBLIOGRAPHY

- *Οργανική Χημεία, L.G. Wade, JR., Εκδόσεις Τζιόλα, 7η Έκδοση.*
- *Οργανική Χημεία, John Mc Murry, Πανεπιστημιακές Εκδόσεις Κρήτης.*
- *Ετεροκυκλική Χημεία με μια Ματιά (1η έκδοση), JOHN A. JOULE, KEITH MILLS. Επιμέλεια: Β. Σαρλή, Εκδότης: Παρισιάνου Α.Ε. 2011.*
- *Βιοοργανική Χημεία, Λιακοπούλου-Κυριακίδου, Εκδόσεις: Ζήτη, Θεσσαλονίκη, 2004.*

Other sources:

- *Journal of Organic Chemistry*
- *European Journal of Medicinal Chemistry*
- *Bioorganic & Medicinal Chemistry*
- *Carbohydrate Research*

COURSE OUTLINE

(93) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_360**	**SEMESTER**	**3RD**
COURSE TITLE	**PHYSICS II**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background
PREREQUISITE COURSES:	There are no prerequisite courses. Knowledge of first semester Physics and Mathematics is required
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes. Project work
COURSE WEBSITE (URL)	

(94) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the Physics course is a background object for the students of the Department of Biosystems Science and Agricultural Engineering, which aims to introduce them to the concepts and methods used to represent and study the various phenomena of the natural world. This knowledge is necessary because it is used to understand complex phenomena related to the field of Biosystems Science and Agricultural Engineering.

The aim of the course is to give the student the knowledge mainly of Engineering and Electromagnetism which are necessary and used in many subsequent courses

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

At the end of the course the student will have acquired the ability to understand and interpret the meaning of basic phenomena that govern physical processes and are expressed quantitatively using mathematics. Additional goal is to be able to:
1. Autonomous Work
2. Teamwork
3. Decision Making
4. Work in an interdisciplinary environment

(95) SYLLABUS

1. Static electricity (electric charge, electric fields, Gaussian law, current and voltage sources, insulating and dielectric conductors, resistors, capacitors)
2. Dynamic and kinematic study of charge in an electric field
3. Dynamic electric (circuit, connection of resistors, capacitors, principles of conservation of charge and energy in electronic devices-rules of Kirchhoff)
3. Capacitor charging and discharging circuits, RC. The global circuit of the earth
4. Magnetic properties of matter. The earth's magnetic field (magnetic dipoles, magnetic field of current conductors, Ampere's law and tubular, magnetic force in moving north-loaded charge).
5. AC currents (sources and capacitors, capacitor circuits, RC filter, induction circuits RL, serial-RCL, power and energy)
6. Electromagnetic induction (inductive currents, induction currents, magnetic flux, Lenz and Fraday law)
7. Principle of operation of the electric motor
8. Light (nature of light, characteristic sizes of the E / M wave, light analysis, polarization, interaction of light with matter: absorption, scattering, refraction, diffraction)
9. Spectroscopy. Emission and absorption spectra. Linear spectra. Infrared and ultraviolet.
10. p-n semiconductor diode and diode applications (zener, schottky, LEDs, Diac, Thyristor, Triac, photovoltaic cells, circuits: semiconductor, voltage stabilizer, step switches)
11. Bipolar contact transistor BJT. BJT as a signal amplifier
12. Digital logic circuits.
13. Communication and data processing systems. Drones

LABORATORY EXERCISES

1. Static electricity experiments
2. Principle of operation of cathodic oscilloscope and signal processing
3. Power transmission circuits (connection of resistors and receivers)
4. Study of RC circuits in step and harmonic excitation. Frequency filters
5. RLC circuit tuning study
6. Induction experiments. Faraday Law
7. Dam spectroscope: analysis, scattering, refraction and diffraction of light
8. Spectrophotometric measurements
9. Characteristic I-V diode curve
10. Characteristic curve of BJT transistor I-V as signal amplifier

11. Portals of digital logic: AND, NAND, OR, NOR
12. Analog-to-digital signal converters (A / D and D / A)
13. Chemical sensors and biosensors control in biosystems6. Hooke's law-Harmonic oscillation of a helical spring (Experimental verification of Hooke's law, determination of the constant k of the spring by measuring its period of harmonic oscillations and determination of the gravitational acceleration of the region)
7. Synthesis of harmonic oscillations (Study of the composition of harmonic oscillations of the same or perpendicular to each other direction investigation of the characteristics of the intersections and Lissajous shapes).
8. Fluid flow measurement
9. Contribution, wave superposition. Stationary mechanical and sound waves
10. Calculation of the Cp / Cv gas ratio
11. Study of isothermal change of ideal gas - Otto Cycle
12. Meteorological measurement systems: P, T, wind speed and direction, humidity, sunshine.
12. Processing and management of meteorological measurements.

(96) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Teaching in the amphitheater: Lectures using electronic media which relate to the theory, exercises and applications in the area of Biosystems and Agricultural Engineering.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>26</td></tr>
<tr><td>Laboratory reports work</td><td>13</td></tr>
<tr><td>Unguided study</td><td>44</td></tr>
<tr><td>Final Exams</td><td>3</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Weight is given to the demonstration of critical ability and the justification of the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the</td></tr>
</table>

	composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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COURSE OUTLINE

(98) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_400**	**SEMESTER**	**4TH**
COURSE TITLE			

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(99) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The learning objectives of the course are

Teach students academic skills to help them become familiar with machine learning topics? artificial neural networks and the possibilities offered by their application to precision agriculture and to the science of Biosystems and Agriculture in general

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(100) SYLLABUS

Computational methods and computational intelligence. Control of agricultural products. Monitoring the condition of crops. Sensors. Neural Maps. Change Detection Algorithms. Utilization of satellite data. Self-organizing map models. Crop yield forecast. Disease identification systems. Crop simulation.

(101) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Virtual Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	***Activity*** / ***Semester workload*** Lectures: 39 labs: 26 UNGUIDED STUDY: 20 Study hours. Literature survey: 30 Course total: ***125***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them. 2.The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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COURSE OUTLINE

(103) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_410**	**SEMESTER**	**4TH**
COURSE TITLE	**ENGLISH FOR SCIENTIFIC WRITING**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(104) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The learning objectives of the course are

To teach students academic skills that help them identify, evaluate and draw valid conclusions in academic texts related to the science of Biosystems and Agriculture

Teach students academic skills to help them write academic work related to the science of Biosystems and Agriculture

To teach students academic speaking skills so that they can actively participate in seminars on the science of Biosystems and Agriculture

To teach students academic oral skills so that they can present work related to the science of Biosystems and Agriculture

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
	Respect for the natural environment

Decision-making *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(105) SYLLABUS

Teaching academic skills and practice through a variety of topics in Environmental Science

1: Whatisenvironmentalscience
2: Whatdoenvironmental scientists do
3: Computersinenvironmental science
4: Energy resources
5: Soilas a resource
6: Recycling waste
7: Ecosystems
8: Preservingbiodiversity
9: Pollution
10: Agriculture
11: Sustainability
12: Literature review seminar
13: Guidance on improving coherence, cohesion and unity in an academic text.

(106) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Virtual Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public*	1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.

Activity	***Semester workload***
Lectures	39
UNGUIDED STUDY	37
Study hours. Literature survey	49
Course total	***125***

presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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COURSE OUTLINE

(108) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_420**	**SEMESTER**	**4TH**
COURSE TITLE	**Soil science**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(109) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The material of the course aims at acquiring knowledge and understanding the basic concepts of SOIL. In particular, soil is studied as a means of plant growth and not as an independent natural system.

The soil determines the possibility of agricultural development of an area and participates in geomorphological and hydrological processes.

He has understood the physical properties of it.

. He has understood its chemical properties.

Has understood the mineralogical properties of it.

Has understood the role of soil organic matter.

He has understood the factors involved in his fertility.

He has understood that soil is an irreplaceable and valuable natural resource that should be treated and used with due care so that it is kept in good condition in perpetuity.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma

Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(110) SYLLABUS

- Generally about soil systems
- Soil factors (basic concepts).
- Granular soil texture.
- Mineral composition of soils (Decomposition. Primary minerals: structure and physico-chemical properties thereof. Secondary minerals: structure and physico-chemical properties thereof. Oxides - iron-aluminum-manganese hydroxides). Amorphous minerals.
- Soil chemical properties (Ion exchange and their importance in plant nutrition. Degree of saturation with bases. Electric potential Z, colloid thrombosis. Soil solution and electrolytes. Soil regulation capacity).
- Soil organic matter (Humic - organometallic compounds. Argylohemic complexes. Importance of organic matter).
- Physical properties of soil (Structure, porosity. Structural improvement. Soil temperature and its importance. Soil air and its importance).
- Soil morphology (Soil distribution and its description. Soil color Soil horizons and levels. Soil classification. Greek soil classes. Mapping and description of cartographic units).

(111) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully

Activity	***Semester workload***
Lectures	39
lab	26
UNGUIDED STUDY	30
Study hours. Literature survey	30
Course total	***125***

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	examined in them. 2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(112) ATTACHED BIBLIOGRAPHY

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COURSE OUTLINE

(113) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_440**	**SEMESTER**	**4TH**
COURSE TITLE	**Strength of Materials**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(114) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of the course, students will be able to accomplish the following:

- Preparation and construction of free body diagrams.
- Solve problems that include static stresses and distortions.
- Calculation of axial deformations of a structure.
- Solving problems with spindles under torsional loads.
- Calculation of displacements in beams under various loads and supports.
- Calculation of shear stresses and bending moments in beams, using the corresponding diagrams.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues

Team work *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(115) SYLLABUS

1. Overview of materials engineering
2. Definition of voltage
3. Mechanical behavior in tension and compression
4 Shear
5. Torsion
6,7 and 8, Beam bending
9. Dislocations in beams and shafts
10. Combined stress
11.12: Mechanical behavior of metallic materials
13. SUMMARY

Each course is accompanied by tutorial exercises or computer simulation exercises.

(116) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Virtual Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	39
UNGUIDED STUDY	37
Study hours. Literature survey	49
Course total	***125***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to*	1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with

students.	other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

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COURSE OUTLINE

(118) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_450**	**SEMESTER**	**4TH**
COURSE TITLE	**GIS**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(119) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The objectives of this course are for students to understand:

• the principles and importance of Geographic Information Systems

• the concepts of spatial data, continuous and discrete

• the concepts of vector and mosaic data

• spatial databases

• methods of processing vector and mosaic data

• cartography

Upon completion of the course students should be able to understand and apply:

• the characteristics and properties of digital geographic data

• recognize and manage vector and mosaic data

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma

Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(120) SYLLABUS

Lesson 1: Historical background, introductory concepts and definitions, general applications
Lesson 2: Geographic Information Systems Data, Data Formats, Types of Spatial Objects or Elements, Performance of Spatial Measurements
Lesson 3: Spatial data structures (or models)
Lesson 4: Converting Vector-Mosaic Data, Capturing - Value Grid
Lesson 5: Databases
Lesson 6: Imaging the Earth - Projectors, Scale Concepts
Lesson 7: Cartography
Lesson 8-10: Data processing and analysis, - Vector Data
Lesson 11-13: Data processing and analysis, - Mosaic data

The course also includes fieldwork on sampling issues.

LABORATORY EXERCISES
Exercise 1-2: Introduction of Spatial and Descriptive Data
Exercise 3: Database Management
Exercise 4-5: Drawing maps
Exercise 6-7: Spatial analyzes
Exercise 8: 3D illustration of ground

(121) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the*	

Activity	***Semester workload***
Lectures	39
lab	26
UNGUIDED STUDY	30
Study hours. Literature survey	30
Course total	***125***

ECTS	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(122) ATTACHED BIBLIOGRAPHY

- *P. A. Burrough, Rachel A. McDonnell (1998) Principles of Geographical Information Systems (Spatial Information Systems)*
- *Karen K. Kemp (Editor) (2008) Encyclopedia of Geographic Information Science, SAGE Publications, Inc.*
- *Ian Heywood, Sarah Cornelius, Steve Carver (2011)An Introduction to Geographical Information Systems*
- *George Korte (2001)The GIS Book 5th Edition*
- *Κωστής Κουτσόπουλος (2002) Γεωγραφικά συστήματα πληροφοριών και ανάλυση χώρου Εκδόσεις Παπασωτηρίου*

Other sources

- International Journal of Geographical Information Systems
- Progress in Physical Geography
- Applied Geography
- GIScience and Remote Sensing
- Geographical Journal
- ISPRS International Journal of Geo-Information
- IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
- GeoInformatica

COURSE OUTLINE

(123) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_460**	**SEMESTER**	**4TH**
COURSE TITLE	**GENETICS**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(124) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is to give students an accurate presentation of the basic concepts and laws of heredity, incorporating where possible the latest scientific findings, to introduce them to the structure, organization and expression of genetic material and to provide them with the basics. to understand at the molecular level the diversity of organisms.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Search, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(125) SYLLABUS

• PRINCIPLES OF MENDELIC INHERITANCE: Mendel's experiments (Mono-Di-Tribridisms). Application of Mendelian genetics in humans. Analysis of genealogical trees. Introduction to hereditary diseases
• THE CHROMOSOMIC THEORY OF INHERITANCE: Linking mitosis and reduction with the transfer of characteristics. Racial chromosomes and sex-linked genes.
• EXTENSIONS OF MENDEL ANALYSIS: The diversity of allelic relations. The multiple alleles. The lethal alleles. The effect of multiple genes on the formation of a trait. Gene penetration and expressiveness. Phenomena. Introduction of statistics in genetic analysis.
• ANALYSIS OF CONNECTED GENES: The discovery of binding. Recombination. Gene binding to racial chromosomes. Connection maps. Connection analysis with 3-point intersections. The phenomenon of interference. Reduction separation and recombination.
• GENETIC MAPPING: Genetic maps. Genetic markers (characteristics and categories). The study of connection in humans. Lod score calculation. Gene cloning based on their chromosomal topography.
• PHYSICAL MAPPING: Physical maps. Cytogenetic mapping. In situ fluorescence hybridization (FISH). Somatic cell hybrids. Natural maps of genomic clones.
• HUMAN GENOME MAPPING PROGRAM: Objectives. Sequencing strategies. Construction of a physical map of genomic clones. Chromosomal walking. In silico sequence analysis and databases. Number of genes encoding proteins. Gene density. RNA-encoding genes. Number of genes and complexity. Genetic diversity (single-nucleotide SNPs polymorphisms, copy number polymorphisms).
• CHROMOSOME MUTATIONS: The topography of chromosomes. Types and mechanisms of induction of structural and numerical chromosomal abnormalities. Deficiencies, permutations, duplications, bicentric and eccentric chromosomes, abnormal euploids and aneuploids. Effect and detection on the human phenotype. Deactivation of the X chromosome.
MUTATIONS: Mutations in somatic and germ cells. Natural and artificial mutations. The molecular basis of mutations. Effects of mutations. Directed mutagenesis in vitro. Randomity of mutations. Mutation selection systems. The Ames test. Shifting elements and shifting mechanisms. Mutations from trinucleotide replication extensions. Repair mechanisms.
MECHANISMS OF GENETIC RECONSTRUCTION: General homologous recombination. The Holliday and Meselson-Radding models. Homologous recombinant proteins. Gene conversion.
• EXTERNAL INHERITANCE: Organ organ genome organization. Mitochondrial DNA replication. Genetic code of mitochondria. Inheritance of mitochondria and chloroplasts. Polymorphism in mitochondrial DNA.
• MULTI-FACTORY INHERITANCE: Basic statistical concepts. Genotypic and phenotypic distributions. The heritability of a trait. Affinity coefficient. Estimation of heritability rate based on twin studies. Identification of genetic factors in multifactorial diseases.
PRINCIPLES OF GENETICS OF BACTERIA AND IONS: Bacteria as model organisms. Development methods and selection indicators. Bacterial and viral chromosomes. Plasmids. Bacterial conjugation. The discovery of the fertility factor F. Bacterial transformation. Recombination mapping. The genetics of phages. The phenomenon of switching.
Each course is accompanied by tutorial exercises or computer simulation exercises.

(126) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training
USE OF INFORMATION AND	• Use of ICT (power point) in Teaching

<table>
<tr><td>COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td></td><td></td></tr><tr><td>UNGUIDED STUDY</td><td>37</td></tr><tr><td>Study hours. Literature survey</td><td>49</td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
2. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
3. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(127) ATTACHED BIBLIOGRAPHY

- *Κλασική και Μοριακή Γενετική, Κ. Τριανταφυλλίδης, Εκδόσεις Αδελφών Κυριακίδη, 2001.*
- *Εισαγωγή στη Γενετική, Αλαχιώτης Σ., Εκδόσεις Ελληνικά Γράμματα Α.Ε. Αθήνα, 2005.*
- *Genes VII, B. Lewin, 7th edition, Oxford University Press, 1999.*
- *An Introduction to Genetic Analysis, Griffiths A. J. F. et al., 7th edition, W H Freeman & Co, 2000.*
- *Principles of Population Genetics, Hartl D. L and Clark A. G., 3rd edition, Sinauer Assoc., 1997.*

Other sources:

- *Nature*
- *Science*
- *Proceedings of National Academy of Sciences, USA (PNAS)*
- *Nature Reviews Genetics*
- *Nature Reviews Molecular Cell Biology*
- *Molecular Cell*
- *Microbiology and Molecular Biology Reviews*
- *EMBO Journal*
- *Molecular Biology and Evolution*
- *Molecular and Cellular Biology*
- *Trends in Biotechnology (TIBTECH)*