COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	AGRICULTURE		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	AGR_706	**SEMESTER OF STUDIES**	7th
COURSE TITLE	Geographical Information Systems In 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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	
Laboratory exercises	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*	Special Background, Skills Development
PREREQUISITE COURSES:	Typically, there are not prerequisite courses.
TEACHING AND ASSESSMENT LANGUAGE:	Greek. Teaching may be however performed in English in case foreign students attend the course.
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (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 course aims to give the students of the Department of Agriculture expert knowledge in the field of Geographic Information Systems (GIS)

The syllabus of this course aims to introduce the students to the basic concepts of geographical information Systems, addressing the theoretical concepts of vector and raster data, the understanding of analysis procedures and spatial data processing so that students can acquire the necessary theoretical knowledge but also skills to analyze spatial information.
Also the lesson refers to concepts and methodologies used in the GIS software, so that students gain a comprehensive understanding of the processes involved in the development and use of a geographic information system.

In this context, the course covers objectives that portray how specific spatial data management methodologies, can be

used in the science of Agriculture

By the end of this course the students will be able to:

1. To understand the basic and critical characteristics of the Geographic Information Systems related to agriculture and environmental issues
2. To have knowledge of the tools and techniques for developing and managing a geographical information system and its capabilities to analyze spatial data
3. To distinguish the differences and the capabilities of various data structures and to select the appropriate in the context of a case study
4. Analyze and solve spatial problems using interpolation methods
5. Use cartographic visualization methodologies and cartographic composition to analyze and present spatial data in the field of Agriculture science
6. Obtain and use spatial data from the Internet

General Abilities

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

Generally, by the end of this course the student will, furthermore, have develop the following general abilities (from the list above):

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Production of free, creative and inductive thinking
Respect for the natural environment
Project planning and management

3. SYLLABUS

1. Introduction
2. Digital geography principles
3. The nature of geographic data and uncertainty
4. Presentation of spatial concepts and data structures
5. Reference systems and transformations
6. Characteristics and capabilities of GIS (Part I)
7. Characteristics and capabilities of GIS (Part II)
8. Characteristics and capabilities of GIS (Part III)
9. Spatial analysis (Parts I, II and III)
10. Digital cartography
11. Acquisition of spatial data from on-line sources

The **Laboratory exercises** include exercises in order to present applications of the methodologies discussed in the theoretical part.
The GIS applications will be implemented using the open source software **QGIS**, which is freely available from:

https://qgis.org/en/site/

Laboratory exercise 1: Design and implementation of cartographic database
Laboratory exercise 2: Georeference and projected coordinate systems - Transformations
Laboratory exercise 3: Digitizing of spatial entities and spatial data quality control
Laboratory exercise 4: Creation of digital terrain model, calculation and presentation of slope, hypsometric curves and hillshade
Laboratory exercise 5 Implementation of spatial interpolation methods for surface creation based on point data
Laboratory exercise 6: Digital map composition
Laboratory exercise 7: Recapitulation – Exemplary solution of exercises

Laboratory exercises 4, 5 and 6 constitute an individual case study, which is mandatory deliverable for the laboratory part of the course

4. TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Lectures in class, in the PC laboratory (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	Use of Information and Communication Technologies (ICTs) (e.g. powerpoint) in teaching. Problem solving with the use of QGIS software. Direct communication with the students (face to face and by e-mail), Support of the learning process and uploading of the educational material to the electronic platform (e-class): https://eclass.upatras.gr
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 (3 contact hours per week x 13 weeks)	39
Laboratory practice (2 contact hours per week x 7 weeks)	14
Mid-term examinations (2 mid-term examinations x 2 contact hours each)	4
Hours for private study of the student / preparation of the individual case study report and preparation for mid-term or/and final examination / Final examination	68
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***125 hours (total student work-load)***

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. Optionally, two mid-term examinations with the final examination grade to be the mean mark. It is mandatory to obtain pass grade (≥5) in each examination. 2. Written examination after the end of the semester. Minimum passing grade: 5. **Evaluation of theoretical part (50%)** Written examination. It is mandatory to obtain pass grade (≥5). **Evaluation of the laboratory work (50%)** Oral examination of the individual case study report. It is mandatory to obtain pass grade (≥5). All the above are taking place in Greek as well as in English for foreign students (e.g. ERASMUS students) if any.

5. RECOMMENDED LITERATURE

1. Burrough, P.A. and McDonnell, R.A., 1998. *Principles of Geographical Information Systems*. New York: Oxford University Press.
2. Longley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W., 2015. *Geographic information system and Science*. 4th ed. England: John Wiley & Sons, Ltd.
3. Goovaerts, P., 1997. *Geostatistics for Natural Resources Evaluation*. Oxford University Press.
4. Conrad, O., Bechtel, B., Bock, M., Dietrich, H., Fischer, E., Gerlitz, L., Wehberg, J., Wichmann, V., and Böhner, J., 2015. System for Automated Geoscientific Analyses (SAGA) v. 2.1.4. *Geoscientific Model Development*, 8 (7), 1991–2007.