COURSE OUTLINE

1. GENERAL

SCHOOL	SCHOOL OF ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**630304**	**SEMESTER**	**2o**
COURSE TITLE	ADVANCED REMOTE SENSING AND GIS APPLICATIONS		

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**
Theory: Lectures	3	5
Laboratory: Use of Software Tools	2	
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*	General knowledge, Scientific Area, Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
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 purpose of the course is students to familiarize and understand through theoretical classes and laboratory practical exercises, advanced methods of Geoinformatics and Earth Observation to solve problems related to the environment and Agriculture. This course analyzes in depth advanced techniques for the creation, processing and analysis of spatial data that include: Digital models of Terrain, Elevation, and Surface, geomorphological analysis, spatial analysis of meteorological data, irrigation management, natural disaster risk analysis, development of applications in GIS environment, Photointerpretation of Longitudinal Earth Observation Data, Longitudinal Change of Land Use/Cover and Landforms, Acquisition of UAV data and analysis – processing these.

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…*
	…….

1. Search, Analysis and Synthesis of Data and Information, using the Necessary Technologies
2. Adapting to New Situations
3. Decision-making
4. Autonomous Work
5. Teamwork
6. Project planning and management
7. Respect for the natural environment

3. SYLLABUS

Advanced modeling techniques in GIS environment

This section covers advanced techniques for creating, processing, and analyzing spatial data in a GIS environment. Topics include digital terrain models (DTMs), digital elevation models (DEMs), and digital surface models (DSMs). These models are used to represent the three-

dimensional shape of the Earth's surface. The section also covers derivative information levels, such as slope, slope orientation, and curvature, which can be derived from these models.

Digital soil, terrain, and surface models (DTM, DEM, DSM)

DTMs, DEMs, and DSMs are all digital representations of the Earth's surface. DTMs represent only the elevation of the Earth's surface, while DEMs represent both elevation and surface texture. DSMs represent both elevation and surface cover.

Geomorphological analysis - Advanced analysis techniques

This section covers advanced techniques for analyzing the Earth's surface. Topics include the delineation of mountain masses, the automatic mapping of streams, watercourses, peaks, and ridges, and viewshed analysis. Viewshed analysis is used to determine the area that can be seen from a given point.

Spatial analysis of meteorological data

This section covers the use of GIS to analyze meteorological data. Topics include the spatial analysis of irrigation needs of crops, irrigation management, and the estimation of crop water stress.

Estimation of the potential of renewable energy sources with geospatial methods

This section covers the use of GIS to estimate the potential of renewable energy sources, such as solar and wind energy.

Flood risk analysis and mapping of flooded areas

This section covers the use of GIS to analyze flood risk and to map flooded areas.

Development of applications in GIS environment

This section covers the development of applications in a GIS environment. Topics include examples of applications in Python programming language.

Photointerpretation of longitudinal Earth observation data

This section covers the interpretation of Earth observation data over time.

Longitudinal change of land use/cover and landforms

This section covers the changes in land use, land cover, and landforms over time.

Acquisition of UAV data and analysis - processing thereof

This section covers the acquisition and analysis of data from unmanned aerial vehicles (UAVs).

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classroom and in laboratory (face-to-face)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Exploitation of Information and Communication Technologies in teaching, in laboratory training and in communication with students. Use of dedicated software. Use of integrated e-learning system. Communication with students via open eclass platform and e-mail.
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*	See table below
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.*	Four written laboratory exercises (40%) of study cases (development of spatial data, their processing, modeling, calculations, cartography). Oral examination (60%) on how to deal with and implement the study cases that each student (or group of students) faced. **Marking Scale:** 0-10. **Minimum Passing Mark:** 5.

Activity	***Semester workload***
Lectures	35 hours
Laboratory work and case studies	75 hours
Exercises and presentations	15 hours
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

Proposed literature:

1. Spatial Statistics, Daniel A. Griffith, Yongwan Chun, LAST MODIFIED: 26 NOVEMBER 2019, DOI: 10.1093/OBO/9780199363445-0125