COURSE OUTLINE

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	630038	**SEMESTER**	A
COURSE TITLE	GEOSPATIAL MODELS FOR SOIL RESOURCE RISK ASSESSMENT		

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 and practical exercises		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*	Scientific field
PREREQUISITE COURSES:	Soil science Geographical Information Systems Soil mapping and soil survey Land degradation and desertification
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English language)
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 course aims at the acquisition of theoretical and practical knowledge, related to the basic principles and concepts on the assessment of the most important land degradation risks as soil erosion by water and desertification.

Upon successful completion of the course, the postgraduate students will have:

- Recognize and define the phenomena of water erosion and desertification.
- Distinguish and understand the key concepts used in evaluating the most important land degradation risks.
- Understand the nature and purpose of different methodologies on the assessment of the most important land degradation risks.
- The ability to apply the most widely used methodologies in assessing the risk of water erosion of agricultural or natural soils, using existing cartographic and laboratory data.
- The ability to apply the methodology of Environmentally Sensitive Areas (ESAs) to desertification, in assessing the risk of land desertification.
- The ability to interpret and evaluate the results of the abovementioned methodologies.
- The ability to compile soil studies of special purpose on issues of soil water erosion and desertification.

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 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
- Project planning and management
- Respect for the natural environment

3. SYLLABUS

Section 1: Introduction to the basic concepts used in the assessment of soil degradation risks.
Theoretical description of the basic concepts used in the assessment of the most important soil degradation risks, description of the main soil degradations, description of the geospatial methods commonly used in these types of assessments.

Section 2: Assessment of water erosion risk using the (R)USLE and PESERA methodologies.
The phenomenon of soil erosion by water. Types of soil erosion by water that can be assessed using the two geospatial models (R)USLE and PESERA. Factors and equations for estimating soil erosion according to the (R)USLE methodology. Basic equations for estimating soil erosion according to the PESERA methodology. Input data and extracted results of the simulation models of both (R)USLE and PESERA methodologies. Implementation of the two geospatial models in a GIS environment.

Section 3: Assessment of land desertification risk using the methodology of the Environmentally Sensitive Areas (ESAs).
The land desertification phenomenon. Composite Soil Quality Index - SQI. Composite Climate Quality Index - CQI. Composite Vegetation Quality Index - VQI. Management Quality Composite Index - MQI. Overall composite land desertification risk index - ESAI. Implementation of the geospatial model in a GIS environment.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classrooms.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, laboratory education, communication with students
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.*	The evaluation will be conducted in Greek, except in the case of Erasmus postgraduate students, for which will be in English. The grade is calculated 50% from the final written examination in multiple-choice and short-answer questions and 50% from the compilation and presentation of the technical report.

Activity	***Semester workload***
Lectures	48
Practical exercises	35
Compilation of a technical report	42
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- *Irvine B. and Kosmas C. (2007). PESERA User's Manual. PESERA Technical Report Deliverable 15, contract QLK5-CT- 1999-01323. Revised for the ENVASSO Project (Contract 022713) by R.J.A. Jones. European Commission FP 5 & 6 research projects, 133pp.*
- *Kairis, O.; Karamanos, A.; Voloudakis, D.; Kapsomenakis, J.; Aratzioglou, C.; Zerefos, C.; Kosmas, C. Identifying Degraded and Sensitive to Desertification Agricultural Soils in Thessaly, Greece, under Simulated Future Climate Scenarios. LAND 2022, 11, 395. https://doi.org/10.3390/land11030395*
- *Kirkby M. J., Irvine B. J., Jones R. J. A., Govers G. and PESERA team, 2008. The PESERA coarse scale erosion model for Europe. Model rationale and implementation. European Journal of Soil Science 59 (6), pp. 1293-1306*
- *Kosmas C. and Kairis O., 2016. Land desertification. In: Environmental Hazards Methodologies for Risk Assessment and Management. Nicolas R. Dalezios (ed), INTERNATIONAL WATER ASSOCIATION PUBLISHING (IWA), 15 December 2016, Pages 550.*
- *Morgan, R.P.C. Soil Erosion and Conservation, 3rd edition. Blackwell Publishing, Oxford, 2005. 304 pp. ISBN 1-4051-1781-8.*
- *Procedures of Land Evaluation55. Cornell University, College of Agriculture & Life Sciences.*
- *Renard, K.G., Foster, G.R., Weesies, G.A., McCool, D.K., Yoder, D.C. (eds) (1997). Predicting Soil Erosion by Water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook 703.*
- *Wischmeier, W. H., and Smith D. D. (1978). Predicting rainfall erosion losses. Agr. Handbk. 537. U. S. Dept. Agr., Washington, D.C.*