COURSE OUTLINE

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**101**	**SEMESTER**	8TH
COURSE TITLE	LAND DEGRADATION AND DESERTIFICATION		
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	3
Laboratory exercises		2	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*	Scientific field		
PREREQUISITE COURSES:	Soil science Problematic soils-Improvement Soil genesis and soil taxonomy Geographical Information Systems		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English language)		
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/courses/3508/		

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 relevant to the concept of land desertification as the result of the extreme, reversible, or irreversible, soil degradation resulted by several main soil degradation processes triggered by anthropogenic or environmental causes.

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

- Understand the nature of the phenomenon of land desertification, the factors and processes that determine it and its importance.
- Understand the methodology for the delineation of Environmentally Sensitive Areas to Desertification in the Mediterranean environment.
- Understand the methodology of treating biophysical and socio-economic indicators' data to assess land desertification risk due to soil erosion by water and soil salinization in any environment.
- The ability to apply and interpret the above-mentioned methodologies for assessing the risk of land 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
- Decision-making
- Working independently
- Team work
- Project planning and management
- Respect for the natural environment

3. SYLLABUS

Section 1: Introductory concepts on soil degradation and land desertification.
The term ‘land desertification' as opposed to ‘depopulation of the countryside'. Definition of the phenomenon of land desertification. Relationships between soil degradation and land desertification.

Section 2: Soil degradation processes and drivers of land desertification.
A. Soil degradation processes: A1) Soil erosion by water and soil erosion due to mechanical cultivation (hilly and inclined soils), A2) Soil salinization and alkalization (lowland areas), A3) Soil acidification, A4) Soil chemical pollution, A5) Soil sealing or covering the soil with impermeable materials, A6) Overgrazing, A6) Land abandonment. B. Factors of land desertification: B1) Soil, B2) Climate, B3) Topography, B4) Hydrology, B5) Vegetation, B6) Land management.

Section 3: Methodology for the delineation of Environmentally Sensitive Areas of the Mediterranean environment.
Soil Quality Index - SQI. Climate Quality Index - CQI. Vegetation Quality Index - VQI. Management Quality Index - MQI. Overall index on the assessment of the land’s environmental sensitivity to desertification - ESAI.

Section 4: Update of the methodology for assessing the risk of land’s environmental sensitivity to desertification.
The scope of updating the original methodology. Main differences between the original and the updated methodology. Data sources of the new methodology.

Section 5: Methodology for treating biophysical and socio-economic indicators’ data to assess the risk of land desertification, caused by various soil degradations.
Fundamental concepts of indicators. Criteria for the selection of environmental indicators. Identification of indicators for assessing land’s desertification risk. Statistical analysis of indicators’ values in assessing the risk of land desertification due to soil erosion and salinization.

Section 6: Greek National Action Plan to combat desertification.
Management and protection measures presentation and analysis of the sensitive and critical, desertification-prone areas.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classrooms and remotely when needed.
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 students, for which will be in English. The grade in the theory of the course is obtained exclusively from the final written examination in multiple-choice and short-answer questions. The grade in the laboratory part of the course is based solely on the compilation and presentation of the abovementioned soil survey.

Activity	***Semester workload***
Lectures	40
Laboratory exercises	30
Compilation of a special purpose soil survey to assess the risk of land desertification using existing data.	55
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- *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.*
- *Kosmas C., Kairis Or., Karavitis Ch., Ritsema C., Salvati L., Acikalin S., Alcalá M., Alfama P., Atlhopheng J., Barrera J., Belgacem A., Solé-Benet A., Brito J., Chaker M., Chanda R., Coelho C., Darkoh M., Diamantis I., Ermolaeva O., Fassouli V., Fei W., Feng J., Fernandez F., Ferreira A., Gokceoglu C., Gonzalez D., Gungor H., Hessel R., Juying J., Khatteli H., Khitrov N., Kounalaki A., Laouina A., Lollino P., Lopes M., Magole L., Medina L., Mendoza M., Morais P., Mulale K., Ocakoglu F., Ouessar M., Ovalle C., Perez C., Perkins J., Pliakas F., Polemio M., Pozo A., Prat C., Qinke Y., Ramos A., Ramos J., Riquelme J., Romanenkov V., Rui L., Santaloia F., Sebego R., Sghaier M., Silva N., Sizemskaya M., Soares J., Sonmez H., Taamallah H., Tezcan L., Torri D., Ungaro F., Valente S., de Vente J., Zagal E., Zeiliguer A., Zhonging W. and Ziogas A., 2014. Evaluation and Selection of Indicators for Land Degradation and Desertification Monitoring: Methodological Approach. ENVIRONMENTAL MANAGEMENT, 54, 951–970 (2014). https://doi.org/10.1007/s00267-013-0109-6.*
- *Kairis Or., Kosmas C., Karavitis Ch., Ritsema C., Salvati L., Acikalin S., Alcalá M., Alfama P., Atlhopheng J., Barrera J., Belgacem A., Solé-Benet A., Brito J., Chaker M., Chanda R., Coelho C., Darkoh M., Diamantis I., Ermolaeva O., Fassouli V., Fei W., Feng J., Fernandez F., Ferreira A., Gokceoglu C., Gonzalez D., Gungor H., Hessel R., Juying J., Khatteli H., Khitrov N., Kounalaki A., Laouina A., Lollino P., Lopes M., Magole L., Medina L., Mendoza M., Morais P., Mulale K., Ocakoglu F., Ouessar M., Ovalle C., Perez C., Perkins J., Pliakas F., Polemio M., Pozo A., Prat C., Qinke Y., Ramos A., Ramos J., Riquelme J., Romanenkov V., Rui L., Santaloia F., Sebego R., Sghaier M., Silva N., Sizemskaya M., Soares J., Sonmez H., Taamallah H., Tezcan L., Torri D., Ungaro F., Valente S., de Vente J., Zagal E., Zeiliguer A., Zhonging W. and Ziogas A., 2014. Evaluation and Selection of Indicators for Land Degradation and Desertification Monitoring: Types of Degradation, Causes, and Implications for Management. ENVIRONMENTAL MANAGEMENT, 54, 971–982 (2014). https://doi.org/10.1007/s00267-013-0110-0.*
- *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*