MODELLO SCHEDA INSEGNAMENTO

Corso di L/LM/LMCU	**Master's Degree in "Geological Sciences and Technologies"**
Denominazione insegnamento:	**Geomorphology Applied to the Soil Conservation**
Numero di Crediti:	**6**
Anno	**I**
Semestre:	**I**
Docente Titolare:	**Paolo MAGLIULO**
Dottorandi/assegnisti di ricerca che svolgono attività didattica a supporto del corso:	**-**
Orario di ricevimento:	**Monday, 14-16** **Wednesday, 11-13**
Indirizzo:	**-**

COURSE OUTLINE

Soil loss is one of the main and most dramatic geoenvironmental problems, especially in areas where the local and weak economy is almost totally based on agriculture (e.g., Sannio and Irpinia). The soil loss mitigation is obviously not possible without a deep knowledge of both its dynamics and the intrinsic features of the soils. The Course of "Geomorphology Applied to the Soil Conservation" is aimed providing to students the theoretical and practical expertise needed to effectively understand and protect the landscape through the correct interpretation and mitigation of the geomorphic erosional and depositional processes responsible of the loss of the "soil resource".

EDUCATIONAL OBJECTIVES

The Course is aimed providing to students knowledge about different soil and soil-conservation concepts, such as: definition and features of the chemical, physical and biological processes responsible of soil formation and evolution (i.e., pedogenetical processes) and relationships between pedogenetical processes and environmental features (climate, geological substratum, organisms, morphodynamic processes, morphometric features of the landsurface, human disturbances...); main

erosional and depositional morphodynamic processes responsible of the "soil-resource" loss, with special focuses on water erosion (both on slopes and fluvial) and mass erosion; soil loss hazard and risk; use of GIS software in the framework of the assessment and mitigation of soil loss, with special focuses on soil erosion susceptibility assessment at the basin scale; soil survey techniques and base-concepts of soil mapping.

The student will obtain skills on: description and interpretation of soil profiles in terms of intensity of soil erosion processes; in field survey, interpretation, quantification and mapping of geomorphological evidence of water erosion (both on slopes and in rivers) and mass erosion of soils; in analyzing recent morphological changes of river channels and in assessing soil loss hazard and risks associated to fluvial dynamics; in GIS-aided compilation and interpretation of maps of slope dynamics and soil erosion susceptibility at the basin scale; in soil survey and associated compilation of soil maps, interpreted in a geo-environmental framework.

PRE-REQUIREMENTS

A good competence with the base-concepts of Physical Geography and Geomorphology is required. Furthermore, knowledge of the main concepts of Mineralogy, Chemistry, Physics, and Aerial Photos Interpretation and GIS Techniques is desirable.

ATTENDANCE

The attendance is not mandatory. However, it is very strongly recommended because of the deep interdisciplinarity of the subject, which requires knowledge and ability in linking different disciplines. Furthermore, different study-cases from Sannio and Irpinia landscapes will be described during the Course. The comprehension of such study-cases, which often are not described in published papers, is fundamental to acquire skills and knowledge about some arguments.

CONTENTS

Soils and pedogenetical processes. Soil forming factors. Morphological, chemical and physical properties of soils and relationships with soil erosion processes. The taxonomy of soil and the soil maps. Water and mass erosion of soils. Relationships between morphogenesis and pedogenesis. Soil losses induces by river channel dynamics and associated hazards and risks. Survey techniques of eroded landsurfaces at the basin scale. Soil erosion susceptibility assessment at the basin scale. Soil survey and mapping.

DIDACTICAL METHODS

The Course consists of 6 CFU: 5 CFU of classroom lessons and 1 CFU in field drills. Classroom lessons will be markedly interactive and will be aimed providing to students a robust theoretical base-preparation, which is fundamental for a correct practical application and reconnaissance of field

evidence of soil loss. The lessons in the field will deal mainly with the survey and the interpretation of erosional landforms. They will be given in landscapes affected by severe soil erosion loss due to slope and fluvial dynamics.

RECOMMENDED BOOKS AND MATERIALS

CREMASCHI M., RODOLFI G. - *Il Suolo. Pedologia nelle Scienze della Terra e nella valutazione del Territorio.* NIS Editrice.

SANESI G. - *Elementi di pedologia. I suoli, loro proprietà, gestione e relazioni con l'ambiente.* Calderini Edagricole.

BAZZOFFI P. - *Erosione del suolo e sviluppo rurale sostenibile.* Edagricole, Bologna.

CASTIGLIONI G.B. – *Geomorfologia*. UTET.

BAGARELLO V., FERRO V. - *Erosione e conservazione del suolo.* MacGraw-Hill editore.

SCHAETZL R.J., ANDERSON S. - *Soils: Genesis and Geomorphology.* Cambridge University Press.

Notes and pamphlets provided by the Professor, which will also provide:

- copy of the Italian version of the video "Let's talk about soil", by Italian Society of Soil Science (SiPE);
- Soil Taxonomy e WRB manuals for soil classification;
- Copy of the manual by Surian et alii (2009) "Linee guida per l'analisi geomorfologica degli alvei fluviali e delle loro tendenze evolutive" for the assessment of the soil losses induced by fluvial dynamics.

EXAMS

The knowledge acquired by the student will be evaluated through a practical test and an oral exam, which will be held together at the end of the Course. During the practical test, the student will describe, interpret and comment aerial photos and/or field-taken photographs of landscape sectors affected by erosional phenomena of different type and intensity. Furthermore, the student will describe what observed during the field drills. During the oral exam, the candidate will discuss subjects explained during the Course. The Professor will evaluate: the competence of the candidate; the capability to link a given argument to others explained during the Course of Geomorphology Applied to the Soil Conservation and/or other similar Courses; the correct use of technical language; the capability to illustrate through real study cases the discussed subjects; and finally the expressive capability. No verifications exams are scheduled during the Course. However, this latter will be strongly interactive.

EXAMS SCHEDULE

See link

EXAMS BOOKING

See link

SYLLABUS

Subject	N. of hours	Recommended books and/or materials	Type of lesson
The soil and the pedogenetical processes. The Jenny equation and the soil-forming factors. Morphological, chemical and physical properties of soils and relationships with soil erosion processes. Taxonomy and classifications of soils.	12	CREMASCHI M., RODOLFI G. - *Il Suolo. Pedologia nelle Scienze della Terra e nella valutazione del Territorio.* NIS Editrice. SANESI G. - *Elementi di pedologia. I suoli, loro proprietà, gestione e relazioni con l'ambiente.* Calderini Edagricole. SCHAETZL R.J., ANDERSON S. - *Soils: Genesis and Geomorphology.* Cambridge University Press. USDA – *Keys to Soil Taxonomy.* FAO - *World Reference Base for Soil Resources*	Classroom lessons
Water and mass erosion of soils. Fluvial dynamics-induced soil loss and associated hazards.	10	CASTIGLIONI G.B. – *Geomorfologia.* UTET. BAZZOFFI P. - *Erosione del suolo e sviluppo rurale sostenibile.* Edagricole, Bologna. SURIAN N., RINALDI M. & PELLEGRINI L. - *Linee guida per l'analisi geomorfologica degli alvei fluviali e delle loro tendenze evolutive.* CLEUP editrice.	Classroom lessons
Relationships between morphogenesis and pedogenesis.	14	CREMASCHI M., RODOLFI G. - *Il Suolo. Pedologia nelle Scienze della Terra e nella valutazione del Territorio.* NIS Editrice. SANESI G. - *Elementi di pedologia. I suoli, loro proprietà, gestione e*	Classroom lessons

		relazioni con l'ambiente. Calderini Edagricole. BAZZOFFI P. - *Erosione del suolo e sviluppo rurale sostenibile.* Edagricole, Bologna. SCHAETZL R.J., ANDERSON S. - *Soils: Genesis and Geomorphology.* Cambridge University Press.	
Techniques of survey of eroded landsurfaces at the basin scale. Soil erosion susceptibility assessment techniques.	4	BAGARELLO V., FERRO V. - *Erosione e conservazione del suolo*. MacGraw-Hill editore. *Appunti, dispense e pubblicazioni fornite dal docente*.	Classroom lessons
Soil survey techniques	5	CREMASCHI M., RODOLFI G. - *Il Suolo. Pedologia nelle Scienze della Terra e nella valutazione del Territorio.* NIS Editrice. SANESI G. - *Elementi di pedologia. I suoli, loro proprietà, gestione e relazioni con l'ambiente.* Calderini Edagricole.	Classroom lessons
Survey and interpretation of geomorphological field evidence of soil losses induced by fluvial dynamics and of slope erosional landforms shaped by water and mass erosion processes.	9		Field drill