



Dipartimento di Scienze e Tecnologie

ANNO ACCADEMICO 2017/2018

PROGRAMMA

I ANNO

**CORSO DI STUDIO IN “Scienze e Tecnologie Geologiche” (Laurea Magistrale)
INSEGNAMENTO DI “Geomorfologia Applicata alla Conservazione del Suolo” (6 CFU)**

PROFESSOR: Paolo MAGLIULO

The erosion of soils. Agents and types of erosion.

Water erosion. Raindrop impact and splash erosion. Soil crusting and soil sealing. Runoff. Rillwash, sheetwash and gullyng. Saturated overland flow: definition and predisposing soil features. Sheet erosion. The Manning’s equation. Field evidence of sheet erosion. Rill erosion: definition and field evidence. Gully erosion: genesis, evolution and morphometry of gullies. Soil features predisposing to gully erosion. Sub-surface flow and tunnel erosion: general features and predisposing soil features. Relationships between tunnel erosion and gully erosion.

Soil loss induced by river channel dynamics. Relationships between land-use changes and river dynamics. Relationships between floods and soil loss. Short-term channel adjustments and relationships with hazards and risks associated to the soil loss. Direct and indirect soil loss hazard induced by channel dynamics. Relationships between river channel incision and soil loss. Soil loss induced by river sedimentation. The Calore River study-case.

Mass erosion. Relationships between soil features and shallow gravitational processes. Soil slips: definition and predisposing pedological features. Slow regolith movements (soil creep and solifluction): definition and geomorphological field evidence.

The role of the vegetation in reducing soil erosion.

The soil as indicator of the morphogenetical processes.

The soil as open, confined and closed system. The Jenny’s equation and the soil forming factors. Relationships between climate and pedogenesis: zonal soils (aridisols, gelisols and oxisols) and azonal soils. The role of parent material in pedogenesis. Relationships between geomorphology (morphotopography and morphodynamics) and soils. The “catena” concept. The role of the organisms in pedogenesis. Relationships between human disturbances and soil formation. The “time” soil forming factor in pedogenesis.

Physical soil properties. Soil granulometry and relationships with erosional processes. Soil structure: general concepts, types and relationships with erosional processes. Soil colour and geo-environmental significance. *Hue, value* and *chroma*.

Genetical horizons: general features and geomorphological and geo-environmental significance. “O”, “A”, “E” and “B” horizons: general features, pedogenetical processes, and geomorphological and geo-environmental features. Carbonate dynamics. Clay illuviation. Cracks, slickensides and wedge-structure. Gleying and redoximorphic features. Residual mineral and sesquioxides. Rubefaction and brunification. Cemented horizons: general features, forming processes and relationships with soil erosion. “C” and “R” horizons. Transitional horizons. Discontinuities: definition, significance, genesis and role in the erosional



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processes. Horizons boundaries: types and geomorphological and geo-environmental interpretation. Quantification of the pedogenetical features

The classification of soils. The USDA *Soil Taxonomy*: structure, limits and advantages. Diagnostic horizons and properties. The *Soil Taxonomy* categories. Soil moisture and temperature regimes. Families. The *World Reference Base*.

Inceptisols and Entisols: taxonomy, morphoclimatic framework, relationships with soil erosion processes and geomorphological, geo-environmental and pedological problems.

Mollisols: taxonomy, morphoclimatic framework, relationships with soil erosion processes and geomorphological, geo-environmental and pedological problems.

Andisols: taxonomy and diagnostic properties (andic properties). *Short range minerals*. Morphoclimatic framework, relationships with soil erosion processes and geomorphological, geo-environmental and pedological problems.

Mollisols: taxonomy, morphoclimatic framework, relationships with soil erosion processes and geomorphological, geo-environmental and pedological problems.

Vertisols: taxonomy and diagnostic properties (vertic properties). Pedoturbation. *Self-mulching* and *gilgai*. Morphoclimatic framework, relationships with soil erosion processes and geomorphological, geo-environmental and pedological problems.

Relationships between morphogenesis and pedogenesis. Erosion rate versus soil formation rate. Morphological and chemical indexes of pedogenetical evolution.

Techniques of survey of the eroded landsurfaces at the basin scale: classical techniques of geomorphological analysis and remote sensing. The susceptibility to soil erosion: definition, assessment at the basin scale (heuristic and statistical methods) and case studies from Campanian Apennines. The causal factors. The use of GIS in the susceptibility assessment.

Soil survey and mapping. The role of the geologist in surveying and mapping soils. Cartographic units.

Elements of paleopedology. Paleopedology-based paleoenvironmental reconstruction. Types of paleosols. Micromorphology of soils.