TITOLO DEL CORSO VIRTUAL OUTCROP MODELS IN GEOSCIENCES			
Settore Scientifico - Disciplinare: GEO/03		**CFU: 6** (2 LF + 3 LAB + 1AC)	**Ore: 68**
Ore di studio per attività:	**Lezioni frontali:** 2	**Laboratorio:** 1	**Attività di campo:** 0.56
Tipologia di attività formativa: affine ed integrativo			

SYLLABUS

Prerequisiti:
Mathematics, basic knowledge of informatics, Geology

Lezioni frontali	
numero di ore 2	Argomento: *Introduction to Virtual Outcrop Models*. Topographic surveying. Terrestrial and airborne remote sensing. Active and passive sensors. Laserscan (LiDAR) and multi view photogrammetry.
numero di ore 2	Argomento: *3D representation*. Point clouds, meshes and textured meshes.
numero di ore 4	Argomento: *Structure From Motion - Multi view photogrammetry*. Mathematical fundaments.
numero di ore 4	Argomento: *3D model building and georeferentiation*. Planning of surveys. Ground control points. Scaling and orienting Virtual Outcrop Models.
numero di ore 2	Argomento: *Errors and quality assessment.* Quantifying error and detecting model's distortion in Structure from Motion-Derived Virtual Outcrop Models
numero di ore 2	Argomento: *Analysis of 3D model*. Data extraction and analysis.
Laboratorio	
numero di ore 24	Attività: Metashape (Agisoft Photoscan) and Visual SFM will be used to produce virtual outcrop models of geological exposures.
numero di ore 12	Attività: CloudCompare, Meshlab and other open source software packages will be used to scale, orient and georeferenced virtual outcrop models, to build meshes and textured mashes from point clouds, and to extract and analyze geological data.
Attività di campo	
numero di ore 16	Attività Structure From Motion -Multi View photogrammetry survey

Risultati di apprendimento attesi
Knowledge and understanding: The students must demonstrate knowledge and understanding of Virtual Outcrop Models construction and analysis. The student must be ready to engage in discussion about Structure From Motion – Multi View photogrammetry.
Applying knowledge and understanding: The student must show to be able to plan a photogrammetric survey and built and georeferenced virtual outcrop models, aimed at environmental, geological, and engineering studies
Making judgements: The students must have the ability to integrate the newly acquired knowledge of the Structure From Motion – Multi View photogrammetry method with previously acquired knowledge on geosciences.
Communication: The students must be able to communicate clearly and unambiguously key concepts of the Structure From Motion – Multi View photogrammetry to specialist and non-specialist audiences. In discussing scientific literature, the basic principles of the methods and their application must be communicated with appropriate language.
Learning skills: The students must possess the learning skills to allow them to continue studying the subject without supervision.
Modalità di verifica dell'apprendimento
Esame finale: Oral exam, with discussion of the models prepared during the laboratory activity