



## MODELLO SCHEDA INSEGNAMENTO

<b>Corso di LM</b>	<b>Scienze e tecnologie geologiche</b>
<b>Denominazione insegnamento:</b>	<b>Applied Geophysics - Mod. A</b>
<b>Numero di Crediti:</b>	<b>6</b>
<b>Semestre:</b>	<b>I</b>
<b>Docente Titolare:</b>	<b>Raffaella De Matteis</b>
<b>Dottorandi/assegnisti di ricerca che svolgono attività didattica a supporto del corso:</b>	
<b>Orario di ricevimento:</b>	
<b>Indirizzo:</b>	

### PRESENTATION OF THE COURSE

The Applied Geophysics course (module A) deals with some of the major geophysical techniques used for exploring the Earth's interior. Knowledge of the theoretical and practical basis of the main exploration methods is essential for the definition of the subsoil structure in terms of physical parameters of rocks, useful in various fields such as hydrocarbon exploration, hydrogeological and engineering investigation.

### KNOWLEDGES AND SKILLS

The student will acquire the basic elements of the theory of electrical and seismic survey methods. The student will be able to apply the methods and to analyze and interpret geophysical data to solve simple geological problem. The student will learn how to use the instrumentation through practical field exercises.

### REQUIREMENTS

Basic knowledge in Mathematics and Physics. Elasticity theory. Electrostatics..

### ATTENDANCE

The attendance at the course is recommended because the student will benefit from classroom and field exercises, which will enable him to apply knowledge to solve problems.

## CONTENTS

Overview of geophysical methods. Seismic refraction surveying. Seismic reflection surveying. Seismic tomography. Electrical resistivity method. Inverse theory in geophysics. Introduction to digital signal processing.

## TEACHING METHODS

The course consists of lectures for the transmission of knowledge and exercises for the practical application of knowledge and understanding skills, learning from oneself and solving problems.

## BOOKS

1. Carrara E., A. Rapolla , N. Roberti. I metodi geoelettrico e sismico per le indagini superficiali del sottosuolo. Biblioteca Scientifica, Liguori Editore
2. Lillie R.J., Whole Earth Geophysics, Prentice Hall
3. Norinelli A., Elementi di Geofisica Applicata, Ed. Patron
4. Telford W.M., L.P. Geldart, R.E Sheriff. Applied Geophysics. Cambridge University Press, 1990.
5. Zollo A., e A. Emolo - Terremoti e onde. Metodi e pratica della sismologia moderna. Liguori Editore, 2011

## EXAM

The exam consists of a final oral examination. The exam will evaluate the knowledge of the topics covered in the course, the relevance of the answers to the questions asked, clarity of exposure, the scientific-technical language and the analytical capacity.

## EXAMS SCHEDULE

Rinvio al link

## ENROLL FOR EXAMS

Rinvio al link

## SYLLABUS

Argomenti	Ore	Riferimenti bibliografici	Tipologia di lezione
Overview of geophysical methods, planning a geophysical survey, survey constraints, target identification, noise, data analysis.	3	2	lecture
Introduction to digital signal processing.	3	5	lecture
Electrical resistivity method: rock resistivity, current flow in an homogeneous earth, electrode	13	1, 3	lecture

configurations and geometric factors, instrumentation, media with contrasting resistivities, vertical electrical sounding, resistivity curve, master curves, interpretation methods, equivalence, pseudo-section.			
Seismic refraction surveying, raypath and travel time curves for direct and refracted waves, two-layer, three-layer and multilayer structures, dipping layer case, irregular interfaces, seismic energy sources, detection of seismic waves. Data interpretation.	12	1, 3	lecture
Seismic reflection surveying, raypath and travel time curve for reflected waves, dipping layer case, multilayer structures, survey layouts, reflection data processing, normal moveout, zero offset section, common midpoint section, velocity analyses, migration.	6	2, 4	lecture
Seismic instrumentation.	2	3, 5	lecture
Inverse theory in geophysics, formulating inverse problems, the linear inverse problem, examples of inverse problems, solution of the linear inverse problem, the least square solution.	3	5	lecture
Seismic tomography.	2	5	lecture
Exercises	10		Classroom and field exercises