
COURSE: Structural Geology

ACADEMIC YEAR: 2018-2019

TYPE OF EDUCATIONAL ACTIVITY: Basic

TEACHER: Fabrizio Agosta

e-mail: fabrizio.agosta@unibas.itwebsite: scienze.unibas.it/site/home.html

phone: 0971-206176

mobile (optional):

Language: **English**

ECTS: (frontal lectures
and tutorials/practice)
8 (6 frontal lectures, 2
laboratory practice and
field excursions)n. of hours: (lessons e
tutorials/practice)
72 (48 frontal lectures, 24
laboratory practice and
field excursions)Campus: **Potenza**
Dept./School: **Dipartimento di
Scienze**
Program: **Geological Sciences**Semester:
from March
1st.2019 to June
30th 2019
II semester

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course is aimed at providing the basic concepts on plate tectonics, stress, strain and on the rheology of upper crustal rocks. An effort is made to introduce the mathematical tools needed to fully characterize both stress and strain fields. The course focuses on the structural elements typical of brittle and ductile styles of deformation. Exercises deals with the 3D stereographic projection of deformed rock volumes, and the Mohr's circle methodology. Field trips provide a great opportunity to the students for observing faults, fractures and folds, as well as for learning the basic tools of structural geology.

PRE-REQUIREMENTSPhysics I y

SYLLABUS**Introduction to Plate Tectonics (8 hours)**

- INNER STRUCTURE OF THE EARTH
- ISOSTASY
- BOUGUER GRAVIMETRIC ANOMALIES
- PLATE KINEMATICS
- MAIN TYPES OF PLATE MARGINS
- HORST-GRABEN, DOMINO FAULTS AND LISTRIC FAULTS
- FOLD-AND-THRUST BELTS
- TRANSPRESSION AND TRANSTENSION
- INTRODUCTION TO THE STRUCTURAL SETTING OF THE ITALIAN PENINSULA

Stress analysis (8 hours)

- MASS A SURFACE FORCES
- STRESS
- STRESS ELLIPSE
- STRESS ON A PLANE
- STRESS ELLIPSOID
- MOHR CIRCLE
- STRESS CLASSES
- DEVIATORIC STRESS
- STRESS TENSOR

Strain analysis (8 hours)

- DEFINITION OF STRAIN
- LINEAR STRAIN
- SHEAR STRAIN
- STRAIN ELLIPSE
- PURE SHEAR
- SIMPLE SHEAR
- STRAIN ELLIPSOID
- STRAIN VOLUMETRIC
- INFINITESIMAL STRAIN
- FLINN DIAGRAM

Rheology (12 hours)

- RECOVERABLE DEFORMATION
- PERMANENT DEFORMATION
- MAIN DEFORMATION MECHANISMS
- CATALCASTIC FLOW
- ROCK SAMPLES UNDER UNIAXIAL TRACTION
- EXTENSIONAL FRACTURES
- HYBRID FRACTURES
- GRIFFITH CRITERION
- ROCK SAMPLES UNDER UNIAXIAL AND TRIAXIAL COMPRESSION
- NAVIER-COULOMB-MOHR CRITERION
- VON MISES CRITERION
- ROLE OF CONFINING PRESSURE, TIME, TEMPERATURE AND FLUIDS ON RHEOLOGY
- GENERAL CRITERION

Fractures, faults and folds (12 hours)

- JOINT MORPHOLOGY
- JOINT NUCLEATION, PROPAGATION, AND ARREST
- TENSION GASHES
- SINTAXIAL AND ANTIAXIAL VEINS
- STILOLITED
- FAULT KINEMATICS
- STEREOGRAPHIC PROJECTIONS
- ANDERSON THEORY
- NORMAL, INVERSE AND STRIK-SLIP FAULTS
- S-C TECTONITES
- MYLONITES
- FOLD GEOMETRY
- FOLD ORIENTATION
- FOLD CLASSIFICATION ON THE BASIS OF: PROFILES, ISHONES, THICKNESSES
- FOLD MECHANISMS: ACTIVE VS. PASSIVE
- KINEMATICS MODELS: FLEXURAL FLOW, FLEXURAL SLIP AND FOLDING FOR NEUTRAL SURFACE
- FOLD INTERFERENCE STRUCTURES

Analyses of fractured and folded rock volumes (32 hours)

- FIELD TRIP ACTIVITIES

TEACHING METHODS

Frontal lectures, Field excursions.

EVALUATION METHODS

Intermediate verifications and oral examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

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- Structural Geology, Fossen, Cambridge 2015
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INTERACTION WITH STUDENTS

The teacher shares all needed material (power point presentation, geological maps, scientific articles) with the students by mean of dropbox. Furthermore, the teacher can be always reached by email: fabrizio.agosta@unibas.it.

EXAMINATION SESSIONS (FORECAST)¹

26/6/2019 - 17/7/2019 - 25/9/2019 - 16/10/2019 - 18/12/2019 - 19/2/2020 – 11/3/2020

SEMINARS BY EXTERNAL EXPERTS YES X NO

FURTHER INFORMATION

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.