DIPARTIMENTO DI SCIENZE

COURSE: **Structural Geology**			
ACADEMIC YEAR: **2019-2020**			
TYPE OF EDUCATIONAL ACTIVITY: **Basic**			
TEACHER: **Fabrizio Agosta**			
e-mail: fabrizio.agosta@unibas.it		website: scienze.unibas.it/site/home.html.	
phone: 0971-206176		mobile (optional): 334-9014541	
Language: **Italian**			
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 2nd 2020 to June 20th 2020 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-REQUIREMENTS

Physics I

SYLLABUS

Introduction to Structural Geology (4 hours frontal lectures)

- INNER STRUCTURE OF THE EARTH
- ISOSTASY
- BOUGUER GRAVIMETRIC ANOMALIES
- INTRODUCTION TO THE STRUCTURAL SETTING OF THE ITALIAN PENINSULA

Stress analysis (8 hours frontal lectures + 4 hours laboratory activities)

- 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 frontal lectures + 4 hours laboratory activities)

- DEFINITION OF STRAIN
- LINEAR STRAIN
- SHERA STRAIN
- STRAIN ELLIPSE
- PURE SHEAR

- SIMPLE SHEAR
- STRAIN ELLIPSOID
- STRAIN VOLUMETRIC
- INFINITESIMAL STRAIN
- FLINN DIAGRAM

Rheology (12 hours)

- RECOVEREABLE DEFORMATION
- PERMANENT DEFORMATION
- MAIN DEFORMATION MECHANISMS
- CATACLASTIC 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 (16 hours)

- JOINT MORPHOLOGY
- JOINT NUCLEATION, JOINT PROPAGATION, AND JOINT ARREST
- TENSION GASHES
- SINTAXIAL AND ANTIAXIAL VEINS
- STILOLITES
- 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 (16 hours)

- FIELD TRIP ACTIVITES ALONG THE AXIAL PORTION OF THE SOUTHERN APENNINES FODL-AND-THRUST BELT EXPOSED IN THE SAURO AND AGRI VALLIES OF THE BASILICATA REGION

TEACHING METHODS

Frontal lectures, Laboratory activities (Mohr circles, stereographic projections), Field excursions.

EVALUATION METHODS

Intermediate verifications and oral examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Structural Geology, Fossen, Cambridge 2015

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]

23/6/2020 - 21/7/2020 - 22/9/2020 - 20/10/2020 - 15/12/2020 - 26/2/2021 – 24/3/2021

SEMINARS BY EXTERNAL EXPERTS YES X NO

FURTHER INFORMATION

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