
COURSE: Applied Structural Geology

ACADEMIC YEAR: 2019-2020

TYPE OF EDUCATIONAL ACTIVITY: Characterizing

TEACHER: Fabrizio Agosta

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

phone: 0971-206176

mobile (optional):

Language: **english**

ECTS: (lessons e
tutorials/practice)
6
(4 frontal lectures, 2
laboratory practice and
field excursion)n. of hours: (lessons e
tutorials/practice)
56
(32 frontal lectures, 24
laboratory/field excursion)Campus: **Potenza**
Dept./School: **Dipartimento di
Scienze**
Program:Semester:
(date)
**I Semester: from
October 1st 2019 to
January 20th 2020**

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course is aimed at providing the basic knowledge on: (i) deformation mechanisms associated to faulting and fracturing, (ii) main processes of fault nucleation and development as either single faults or a fault population, (iii) multiscale properties of fault and fractures, (iv) fluid flow modelling of fractured reservoirs. At the end of the course, students will be able to carry out a qualitative/quantitative analysis of brittle deformation at both meso- and macro scales, and perform a statistical analysis of field data aimed at computing the multiscale fault and fracture distribution for reservoir-scale fluid flow modelling.

PRE-REQUIREMENTS

None

SYLLABUS**Fracture mechanics (6 hours)**

- Stress distribution around cavities and stiff inclusions
- Griffith criterion
- Mode I-II-III and anti-Mode I fractures

Fault mechanics (6 hours)

- Navier – Coulomb – Mohr and Anderson theories
- Amonton and Hubbert-Rubey laws
- Byerlee law and dynamic friction

Faulting processes (10 hours)

- Single faults in tight rocks
- Single faults in porous rocks
- Fault populations
- Faults and fractures associated to folding processes

Multi-scale fault and fracture properties (4 hours + 4 hours of laboratory activities)

- Qualitative analysis
- Quantitative analysis
- Mechanical stratigraphy

Anatomy of fractured reservoirs (6 hours)

- Classification of fractured reservoirs
 - Primary and secondary porosity
 - Permeability tensors for fractured reservoirs
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Geocellular modelling of fractured rock masses (12 hours of laboratory activities + 8 hours of field trip)

- 3D Discrete Fracture Modelling by mean of the MOVE™ software produced by Midland Valley.

TEACHING METHODS

Frontal lectures, Laboratory Activities, Field excursions.

EVALUATION METHODS

Student presentation and oral examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Structural Geology, Fossen, Cambridge 2010
- Fundamentals of Structural Geology. Pollard D. & Fletcher D., Cambridge University, 2005 (*suggested*)
- Geologic Analysis of Naturally Fractured Reservoirs. Nelson R., Gulf Professional Publishing, 2001
- Scientific articles

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

26/02/2020 – 25/03/2020 - 24/6/2020 - 22/7/2020 - 23/9/2020 - 21/10/2020 - 16/12/2020 - 25/2/2021 – 26/3/2021

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.