DIPARTIMENTO DI SCIENZE

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| COURSE: chemistry of hydrocarbons | | | |
| ACADEMIC YEAR: 2017-2018 | | | |
| TYPE OF EDUCATIONAL ACTIVITY: (Basic, Characterizing, Affine, Free choice, Other) characterizing | | | |
| TEACHER: Maurizio D'Auria | | | |
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| phone: +390971205480 | | mobile (optional): | |
| Language: English | | | |
| ECTS: (lessons e tutorials/practice) 6 | n. of hours: (lessons e tutorials/practice) 52 | Campus: Potenza<br>Dept./School: Dipartimento di Scienze<br>Program: Geosciences and Georisources **(LM74)** | Semester: second<br>Dal 5 marzo 2018 al 15-30 giugno 2018 |

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The aim of the course is that to give the instruments to understand the composition and the nature of oil. It will be described the most used hypotheses on the oil formation with main focus on the chemical modifications occurred. Determination of both the composition and the properties of oil. Sintetizzare in lingua inglese i contenuti riportati nella scheda in lingua in italiana.

PRE-REQUIREMENTS

General and inorganic chemistry

SYLLABUS

Elements of organic chemistry

Composition and properties of oil - Saturated hydrocarbons:Normal alkanes - Isoalkanes - Cicloalkanes (naphthenes) - Unsaturated hydrocarbons: Alkenes - Aromatics - Naphtheno-aromatics - Compounds containing heteroatoms (NSO): Sulfur - Oxygen - Nitrogen - Metals - Resins and asphalthenes - Diamondoids - Natural gas: Gaseous hydrocarbons - Non hydrocarburic gases - Physical properties of oil: Density - Color - Viscosity - Fluorescence - Pour point - Cloud point - Flash point - Thermal alteration of oil in the reservoir - Classification of oil: Classification based on the distillation fractions - Classification based on geological indications - Classification based on the different components of oil - Classification based on geochemical properties

Origin of oil: The inorganic theory (abiogenic). The organic theory (biogenic): Generation of oil, migration and accumulation in sedimentary basins - The cycle of carbon: Organic material in the sediments - Classification of the sedimentary organic material - Genesis of oil: Diagenesis, Chemical composition of kerogen, Katagenesis, Difference between carbon/anthracite and bitumen/oil, Metagenesis - Migration and accumulation of the hydrocarbons - Mechanism of the primary migration: Migration controlled by diffusion, Migration in solution, Hydrocarbon phase migration, Distance and direction of primary migration - Secondary migration: Accumulation and its efficiency

Geochemical Methods in petroleum exploration: Isolation of kerogen and bitumen - Petrografical methods: Microscopic organic analysis(MOA), Thermal alteration index (TAI), Vitrinite reflectance (R0) - Geochemical methods: Carbon ratio, Total organic carbon, Elemental Analysis - Stable isotope analysis - Pyrolysis (Rock-Eval) - Time-temperature index - Level of organic metamorphism (LOM) - Correlation between geochemical and petrographic techniques

Evaluation of a source rock: Principles on the evaluation of a source rock: Measurement of source rock capacity, Estimation of original source rock capacity (G0) - Interpretation od source rock data: Quantity of organic matter, Type of organic matter, Maturity - Quantitative volumetric estimation of source rock hydrocarbons in a basin - Ateration Processes on oil composition - Petroleum-petroleum correlation - Petroleum-source rock correlation

Analytical techniques: Biomarker - Analytical techniques in petroleum exploration: Sampling, storage an analysis, Kerogen and bitumen analysis - Column chromatography - Gas chromatography - Mass Spectrometry - GC-MS coupling - Geochemical high resolution technologies - Spectroscopical methods: Ultraviolet spectrophotometry (UV), Visible spectrophotometry, Infrared spectroscopy (IR), Electronic spin resonance spectroscopy (ESR), Nuclear magnetic resonance spectroscopy (NMR), Thermogravimetry (TG) and thermal differential analysis.

TEACHING METHODS
Theoretical lessons

EVALUATION METHODS
Oral examination

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL
o M. D'Auria, Chimica e Petrolio, Gruppo Editoriale l'Espresso, 2014, ISBN 978-88-91077-80-6

INTERACTION WITH STUDENTS
Starting the course, after the dsecription of the objectives, syllabus and evaluation methods, the teacher gives to the students the electronic available material. The All'inizio del corso, dopo aver descritto obiettivi, programma e metodi di verifica, il docente mette a disposizione degli studenti il materiale didattico. It collects a list of students who intend to enroll in the course, together with name, serial number and email.
Office hours: Monday from 15 to 16 at the study and Tuesdays from 15 to 16 at the study
In addition to weekly reception, the instructor is available at all times for a contact with the students, through their e-mail

EXAMINATION SESSIONS (FORECAST)[1]
12.2.2018; 13.3.2018;15.5.2018; 5.6.2018; 2.7.2018; 8.10.2018; 10.12.2018.

SEMINARS BY EXTERNAL EXPERTS YES □ NO x

FURTHER INFORMATION

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