Corso di Laurea in
**SCIENZA E TECNOLOGIA
DEI MATERIALI**

UNIVERSITÀ
DEGLI STUDI DI BARI
ALDO MORO

SYLLABUS – LM.Sc.Mat.

General information	
Academic subject	***COMAPRISON OF OILS FROM TERRESTRIAL DRUPES AND SEEDS WITH OIL FROM AQUATIC BIOMASS***
Degree course	*Materials Science and Technology LM-Sc.Mat. Curriculum BIOREF*
Academic Year	*2nd (2023/2024)*
European Credit Transfer and Accumulation System (ECTS)	2
SSD	*CHIM03*
Language	*English*
Academic calendar	*1nd semester*
Obbligo di frequenza	*YES*

Professor/ Lecturer	
Name and Surname	Francesco Nocito
Email address	Francesco.nocito@uniba.it
Office telephone number	+39 0805442086
Department and address	*Department of Chemistry, University of Bari "Aldo Moro", via Edoardo Orabona, 4, Bari (Italy)*
Virtual platform	*Microsoft Teams if strictly necessary*
Tutoring (time and day)	After contacting by email

Syllabus	
Learning Objectives	Acquisition of knowledge about the biorefinery concept, from cultivation to transformation of biomass. Study on the chemical processes for laboratory and industrial scale production, characterization and applications of oils obtained from aquatic and terrestrial biomass. Their differences from the point of view of chemical characteristics.
Course prerequisites	Basic knowledge of general chemistry, organic chemistry and analytical chemistry
Contents	• The problem of fossil sources from the energy and waste production point of views: Global Warming Potential of different fossil derivatives • Renewable energy sources: strengths and weaknesses • The concept of Biorefinery: a sustainable production of fuels and chemicals • Lignocellulosic Vs oleaginous biomass as feedstock • Biofuels: general • From biomass to: bio-oils, bio-gas, syn-gas, bio-ethanol, bio-diesel • Terrestrial biomass: drupes and seeds • Third generation of bio-fuels: Aquatic biomass (micro and macro-algae) as oil source; Cultivation and harvesting techniques • Chemical composition of oils • Chemical properties of oils • Analytical methods used for quantitative and qualitative characterizations
Books and bibliography	Biorefinery: from biomass to chemicals and fuels, Edited by: Michele Aresta , Angela Dibenedetto and Franck Dumeignil
Additional materials	Other materials will be available during lectures

Work schedule			
Hours			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
50	*16*	*0*	*34*

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CFU/ETCS			
2	*2*	*0*	

Teaching strategy	
	Theoretical lessons with projection of slides aimed at the acquisition of the required knowledge. The active participation of students will be stimulated with questions and discussions with references to current issues of applied research.

Expected learning outcomes	
Knowledge and understanding on:	o knowledge of all the possibilities of converting biomass into fuels and chemicals o knowledge on the chemical composition of lignocellulosic and oilseed biomass, both terrestrial and aquatic o knowledge on the chemical differentiation of lipid fractions
Applied knowledge and understanding	o ability to determine the different lipid fractions and related chemico/physical characteristics through chromatographic and spectroscopic data o ability to choose the crop to be developed according to the geophysical properties of the land/water and the applications of the produced oil o ability to apply different industrial techniques in the transformation of biomass into oil
Transversal skills	• At the end of the course, the student will be able to autonomously evaluate which type of biomass to be use in order to obtain a specific type of bio-oil according to technical/economic evaluations • at the end of the course the student will be able to read and understand scientific documents concerning the chemico/physical properties of oils obtained from terrestrial and/or aquatic biomass and to present his evaluations through a written document and an oral discussion

Evaluation	
Learning verification methods	*Written examination*
Evaluation criteria	• *Knowledge and understanding:* The student will be assessed through a series of questions that will cover the entire program. The more the answers are in-depth explained, the higher the vote will be. • *The written exam will consist of 5 free-answer questions. The exam can be defined as passed with the minimum grade when at least 3 questions have been satisfactorily answered*
Measurement criteria of learning and assignment of the final mark	1 to 17 → less than 3 correct answers or unsatisfactory answers 18 to 24 → 3 to 4 correct and satisfactory answers 25 to 30 cum laude → 5 correct and satisfactory answers