COURSE OF STUDY *INTERNATIONAL MASTER DEGREE COURSE IN INNOVATION DEVELOPMENT IN AGRIFOOD SYSTEMS (IDEAS)*

ACADEMIC YEAR *2023-2024*

ACADEMIC SUBJECT *C.I. Innovation in biomass and wastes management in agrifood systems (9CFU) – Biomass and Waste Characterization (3CFU)*

General information	
Year of the course	First
Academic calendar (starting and ending date)	Second semester (March XX, 2023 – June XX, 2024)
Credits (CFU/ECTS):	3
SSD	*AGR/13 – Agricultural Chemistry*
Language	*Italian*
Mode of attendance	*No compulsory*

Professor/Lecturer	
Name and surname	Roberto Terzano
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Telephone	0805442852
Department and address	*DIP. DISSPA – Università degli Studi di Bari*
Virtual room	*Microsoft Teams: 0ac9vw3*
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Every day, on appointment

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
75	16	14	45
CFU/ETCS			
3	2	1	

Learning Objectives	Basic concepts of analytical chemistry and knowledge of the main analytical methods for the characterization of biomass and wastes. The aim of this course is to provide the student with the tools and knowledge to interact with customers and analytical laboratories and understand reports and adopted procedures as for biomass and waste characterization is concerned.
Course prerequisites	Knowledge of basic mathematics, chemistry and physics
Teaching strategy	Course contents will be presented through PowerPoint, blackboard, multimedia tools and laboratory practice
Expected learning outcomes **Knowledge and understanding**	**Knowledge and understanding on:** • Basic concepts of analytical chemistry • Basic knowledge of the main analytical methods and procedures for the characterization of biomass and waste

Applied knowledge and understanding	• Understanding the most relevant properties of biomass and waste that may influence their applications and transformations **Applied knowledge and understanding on:** • Capacity to valorize biomass and waste based on their physico-chemical and structural properties • Understanding the main advantages and disadvantages of the analytical methods available for the characterization of biomass and waste **Making informed judgments and choices:** • Ability to select the most appropriate analytical methodology to characterize the properties of biomass and waste relevant for their reutilization or transformation **Communicating knowledge and understanding:** • Understanding the needs of the customer and proposing analytical solutions for the valorization of biomass and waste • Ability to interact with analytical laboratories to efficiently characterize biomass and waste for their reutilization or transformation **Capacities to continue learning :** • Ability to deepen and update the knowledge about the most advanced and effective analytical methodologies for biomass and waste characterization
Content knowledge	• Basic concepts of analytical chemistry • Proximate and ultimate analysis • Physico-chemical characterization methods • Structural and textural characterization methods • Particle size, surface area and pore size determination • Thermal analyses • Case studies and applications
Texts and readings	• Miguel Valcarcel Cases, Angela I. Lopez- Jimenez, Foundations of Analytical Chemistry, 2018, Springer • Ange Nzihou Ed., Handbook on Characterization of biomass, biowaste and related by-products, 2020, Springer
Notes, additional materials	Lecture notes and teaching material made available during the course
Repository	All the teaching material will be made available through the Microsoft Team class specifically created for the course.

Assessment	
Assessments methods	The assessment is based on an oral exam consisting on the presentation of a case study and on the discussion of the topics developed during the theoretical lectures and practical laboratories. Students attending the lectures may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for one year.
Assessment criteria	• *Knowledge and understanding* o Knowledge of the basic concepts of analytical chemistry

	o Understanding the main properties useful to characterize biomass and waste, and methods for their assessment • *Applying knowledge and understanding* o Application of the acquired knowledge to solve case studies for specific biomass and waste materials • *Autonomy of judgment* o Capacity to select the most appropriate methodology for the assessment of specific properties of biomass or waste materials • *Communicating knowledge and understanding* o Describing analytical methods and technologies to characterize biomass and waste and understanding reports and procedures related to biomass and waste characterization • *Communication skills* o Communicating efficiently with customers and analytical laboratories for biomass and waste characterization • *Capacities to continue learning* o Ability to understand and develop processes and technologies for biomass and waste valorization
Final exam and grading criteria	The mark of the exam is expressed in thirtieths and a minimum mark of 18 is needed to pass the exam. The final mark is determined based o the case study presentation and the verification of the knowledge of the topics developed during the course.
Additional information	