



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2023/2024
MASTER'S DEGREE (MSC)	MARINE BIOLOGY
SUBJECT	SUSTAINABLE USE OF MARINE BIOLOGICAL RESOURCES
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20879-Attività formative affini o integrative
CODE	21200
SCIENTIFIC SECTOR(S)	AGR/20
HEAD PROFESSOR(S)	MESSINA CONCETTA Professore Ordinario Univ. di PALERMO MARIA
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	MESSINA CONCETTA MARIA Monday 13:00 14:00 diSTeM: Via archirafi o Vle delle Scienze Ed 16, da concordare via email col docente

DOCENTE: Prof.ssa CONCETTA MARIA MESSINA

PREREQUISITES	Basic knowledge of the marine biological resources of fisheries and aquaculture
LEARNING OUTCOMES	Knowledge and ability to understand - Acquisition of theoretical and experimental skills related to the relationship between environmental, biological and supply chain factors on the state and quality of fish production, with particular regard to aspects of sustainability. Acquisition of a specialized scientific language. Ability to apply knowledge and understanding - The course aims to make the student able to assimilate and critically re-elaborate the knowledge acquired, on the interrelationships between marine environment and organisms' response in terms of animal welfare, production performance, quality and sustainability. Acquisition of application skills for the monitoring and management of production systems (fishing, aquaculture, processing), related to the resources of the marine environment and their quality. Autonomy of judgement Acquisition of skills to evaluate and interpret experimental data concerning the state of fish production and their sustainable use. Communication skills Acquisition of adequate skills and tools for communication with reference to the presentation of the results of studies on fish production and their sustainable use, to the transmission and dissemination of information on issues related to the subject of the lessons. Learning Capabilities Acquisition of adequate skills for the autonomous deepening of further competences, with reference to: consultation of bibliographic material, consultation of databases and other information on the web, basic knowledge tools for the continuous updating of knowledge.
ASSESSMENT METHODS	oral exams; scores between 18-30 An entry test is carried out to assess the initial preparation of students. The evaluation is based on the results of an optional ongoing written test (mid-term test) and of a final oral exam. The final mark is given by the average of the midterm test and the final exam (both as a fraction of 30). A positive evaluation of the mid-term test gives the student the opportunity to be evaluated during the final exam of the earliest exam session, on only the contents of the second part of the course, not covered by the mid-term test. The student has the option to refuse the result of the mid-term test before the final exam, which in this case will deal with all the topics of the course. The student is evaluated based on the level of knowledge of the subjects and the ability to link between them, the clarity and the use of a specialised scientific language. Assessment criteria - assessment: excellent, grade: 30 - 30 cum laude, excellent knowledge of the topics of the course, excellent use of language, excellent analytical capacity, ability to apply knowledge to problem solving; - assessment: very good, grade: 26 29, good knowledge of the topics of the course, correct use of language, good analytical capacity, ability to apply knowledge to problem solving; - assessment: good, grade: 24 25, good knowledge of the main topics of the course, correct use of language, limited ability to autonomously apply knowledge to problem solving; - assessment: satisfactory, grade: 21 23, partial knowledge of the topics of the course, satisfactory use of language, limited ability to autonomously apply knowledge to problem solving; - assessment: sufficient, grade: 18 20, minimal knowledge of the main topics of the course and of technical language, scarce ability or inability to autonomously apply knowledge to problem solving; - assessment: fail, insufficient knowledge of the topics of the course
EDUCATIONAL OBJECTIVES	The course explores issues that underline the close correlation between growing global demand for fish products and sustainable use of resources, international trade and issues of product quality and traceability and consumer safety. Fish resources from Mediterranean artisanal and industrial fisheries, marine aquaculture and integrated multitrophic aquaculture and implementation strategies aimed at their sustainable use and at improving competitiveness on international markets will be presented. The effects of abiotic and biotic factors on product quality characteristics will be taken into account: from the effect of climate change to that of farming, slaughtering and processing methods on quality, shelf-life and traceability. Strategies for the valorisation of non-target fisheries and aquaculture species will be examined through: - new processing techniques, both to improve environmental sustainability and to diversify production, with positive effects on the markets and therefore on the reduction of harvesting; - valorization of non-food species and fish product processing waste for the production of marine bioactive molecules (omega-3, chitin, chitosan,

	astaxanthin, polyphenols), functional foods and nutraceuticals, able to support virtuous paths of circular economy.
TEACHING METHODS	Lectures, seminars, training in the lab, working groups.
SUGGESTED BIBLIOGRAPHY	Status of fisheries and aquaculture, FAO, 2018. Dispense fornite dal docente. Articoli scientifici di approfondimento.

SYLLABUS

Hrs	Frontal teaching
4	Marine resources: general overview of food resources with focus on the Mediterranean. Analysis of the main categories of supply chains and products and the sustainability of the respective production systems
3	Small-scale and industrial fisheries resources: sustainability and differentiation of their quality. Effect of consumption on demand, markets and harvesting.
3	Non-target species: enhancement strategies to promote food biodiversity and improve sustainability
3	Strategies to enhance and improve sustainability through innovative processing and transformation techniques
3	Aquaculture products: sustainability, quality and their role in the diet; traditional and innovative species and valorisation and innovation strategies
3	The production of multitrophic integrated aquaculture and combined fish/shellfish production as a strategy for the improvement of sustainability and the production of value-added nutritional components.
3	Effect of species-specific, environmental and supply chain factors on production performance and quality characteristics of products
2	Effect of confinement and slaughter methods on welfare and quality of fish products: EFSA guidelines for farmed species
3	Description of the attributes that characterize the quality of the products: zootechnical performance, product parameters and methods of determination.
3	Description of the attributes that characterize the quality of the products: nutritional parameters. Chemical, physical, and non-destructive/ instrumental methods of determination
2	Description of the attributes that characterize the quality of the products (texture, color): technological parameters. Instrumental detections to support and/or integrate chemical, biochemical and sensorial ones
3	functional food production and recovery of bioactive molecules from processing waste to incentivate circular economy
3	Markers and methods for the traceability of fish products.
2	New labelling rules to support sustainability and quality in the fisheries, aquaculture and processing industry supply chains
Hrs	Practice
6	Visit to aquaculture facilities or online seminars
6	Visit to fish processing companies - demonstration activities in the laboratory, on the application of quality determination techniques