UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2019/2020
MASTER'S DEGREE (MSC)	MEDITERRANEAN FOOD SCIENCE AND TECHNOLOGY
INTEGRATED COURSE	AGROINDUSTRY SUSTAINABLE SYSTEMS AND PLANTS - INTEGRATED COURSE
CODE	20216
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	AGR/09, ING-IND/11
HEAD PROFESSOR(S)	VALLONE MARIANGELA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	VALLONE MARIANGELA Professore Associato Univ. di PALERMO CELLURA MAURIZIO Professore Ordinario Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CELLURA MAURIZIO** Wednesday 10:00 13:00 Stanza Prof. Cellura **VALLONE MARIANGELA** Thursday 10:00 12:00 Studio docente.Dipartimento Scienze Agrarie, Alimentari e Forestali, edificio 4, ingresso E, 1° piano, settore Meccanica Agraria. stanza 133 Friday 10:00 12:00 Studio docente.Dipartimento Scienze Agrarie, Alimentari e Forestali, edificio 4, ingresso E, 1° piano, settore Meccanica Agraria. stanza 133

DOCENTE: Prof.ssa MARIANGELA VALLONE

PREREQUISITES	Basic knowledge of food technologies
LEARNING OUTCOMES	Knowledge and understanding. Acquire sufficient knowledge of the food industry systems management to process and storage Mediterranean food products. Ability to choose the spaces during design and / or advice to the food industry entrepreneurs in the choice of machines and plants for the production of quality foods. The student will gain knowledge and understanding on the circular economy and industrial symbiosis, on the main solutions for the improvement of the energy and environmental performance (eco-design) of agroindustry systems, product environmental labels, standards on the Life Cycle Assessment (LCA). Furthermore, the student will gain knowledge and understanding on the application of the LCA methodology to products and services, with specific focus on the agroindustry processes (e.g. cogeneration), the mass and energy balances, and the energy and environmental impacts of the products and services Applying knowledge and understanding. Ability to assess the technical and plant needs of the food industry of the Mediterranean area related to the type of production. The student will acquire the main concepts of circular economy and industrial symbiosis, to identify the main solutions for the improvement of the energy and environmental performance (eco-design) of products, services and organizations, to perform complete LCAs of products and services of the agroindustry sector, to calculate their carbon footprint and embodied energy, and to know the main typologies of products environmental labels. Making judgements Be able to suggest the choise of machines, plants and relative lay-outs to improve qualitative and quantitative properties of Mediterranean food production. The course will allow the student to comprehend the main problems to face when assessing the energy and environmental performance of products, services and organizations, to suggest eco-design solutions and to assess their effectiveness. Furthermore, the student will be able to understand the basics of the circular economy and the industrial symbiosis and to understand and critically analyze the results of LCA studies. Communication skills. Be able to use a proper simple and technical language in addressing entrepreneurs to maintain good management levels in the agri-food industry of the Mediterranean area. The lectures and features of the final examination aim at the development of the students' communication skills towards all private and institutional stakeholders. Learning skills. Acquire the ability to link the various factors influencing food production according to the actual knowledge through consultation of scientific publications. The student will gain knowledge in the technical-engineering field and will be able to apply the skills acquired during the classes. Furthermore, the student will gain adequate terminologies, mathematical and descriptive methods that characterize the circular economy, the LCA methodology and the systems of products environmental labels.
ASSESSMENT METHODS	The exam is based on a single oral test, aimed to verify the level of knowledge and competencies expected for the course; the final grade ranges from 0 to 30. The maximum grade is given if the exam clarifies that the students master the following three skills: critical and interdisciplinary judgement in the topics of the course; well-developed skills in the understanding of the impacts of the topics of the course in the specific sector, a well-developed ability to represent ideas and/ or innovative solutions in the context of the discipline. The student will discuss the topics studied during the course. The questions, either open or semi-structured and tailored to test the learning results expected, will verify: a) learning verification, b) elaboration capabilities, c) oral capabilities. The minimum number of oral questions during the exam is 3. a) The learning verification by the student will be performed through the analysis of the capability of the student to perform connections between the theoretical and practical contents of the course, b) About the elaboration capabilities of the students, the following skills will be evaluated: b1) perform personal evaluations about the contents of the course; b2) understanding the applications or the implications of the contents in the context of the topics of the course; b3) allocate the contents of the course in the professional and technological reference context; b4) capability of reading and understanding complex systems. c) In the field of the oral skills, the student will receive the lowest grade if he/ she shows a language skill adequate to the professional context but still not optimal, while the maximum grade will be assigned to the students having a complete understanding and mastery of the technical language skills required.

	Grades rating Excellent 30 - 30 cum laude: excellent knowledge of the topics, excellent language skills, the student is able to apply knowledge to solve problems. Very good 26-29: good knowledge of the topics of the course, full mastery of language, the student is able to apply knowledge to solve the proposed problems. Good 24-25: basic knowledge of the main topics, basic technical language skills, limited ability to independently apply knowledge to the solution of problems. Satisfactory 21-23: the student does not have full capabilities but has the knowledge, satisfactory technical language skills, poor ability to independently apply knowledge to problems and different domains. Sufficient 18-20: the student has minimal knowledge of the course topics and minimal technical language, very little or no ability to independently apply the knowledge. Insufficient: the student does not have an acceptable knowledge of the course topics.
TEACHING METHODS	Lectures, technical visits. Lectures and coursework (including examples, exercises and LCA modeling creation).

MODULE
SUSTAINABLE AGROINDUSTRY SYSTEMS

Prof. MAURIZIO CELLURA

SUGGESTED BIBLIOGRAPHY	
1) Standard UNI EN 14040, 14044 e 14001 2) Didactic materials provided during lessons	
AMBIT	21007-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60
EDUCATIONAL OBJECTIVES OF THE MODULE	
The course aims at giving the necessary knowledge to apply sustainable strategies in the perspective of the circular economy, to find solutions to improve the energy and environmental performance (eco-design) of products, services and organizations, to apply the Life Cycle Assessment methodology to products and services of the agroindustry system, to calculate their carbon footprint and embodied energy, and to obtain product environmental labels.	

SYLLABUS

Hrs	Frontal teaching
4	Introduction. The circular economy and the life-cycle thinking approach.
1	Introduction to the Life Cycle Assessment (LCA). Methodological principles and basic features of LCA. The steps of LCA. The international standards of ISO 14040 series.
5	Goal and scope definition. Functional unit, system boundaries, impact categories. Cut-off rules. The report of a LCA study. Data collection and data quality. Software and databases for LCA
7	Life Cycle Inventory (LCI): analysis of process-based and matrix methods. The allocation. Environmental indicators and indices. Life Cycle Impact Assessment (LCIA): indicators and impact assessment methods. Carbon footprint and embodied energy calculation.
6	Interpretation step: analysis of the results and dominance analysis. Uncertainty and sensitivity analysis. Definition of eco-design criteria. Product environmental labels of I, II and III type.
2	Case studies of LCA applied to products and services

MODULE
FOOD PRODUCTION AND AGRO-INDUSTRIAL PLANTS

Prof.ssa MARIANGELA VALLONE

SUGGESTED BIBLIOGRAPHY

G. Nardin – A. Gaudio – G. Antonel – P. Simeoni Impiantistica enologica – Ciclo tecnologico di vinificazione e progettazione degli impianti – Edagricole
Oleum - Manuale dell'olio da olive - Edagricole
Appunti del docente

AMBIT	21007-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60

EDUCATIONAL OBJECTIVES OF THE MODULE

The objective of this course is to deepen the technical and functional characteristics of machines and plants for the food products of the Mediterranean area to improve their quality. The selection criteria and machine management will be studied for the entire production process of extra virgin olive oil, wine and fruit and vegetables. The food processing, storage and packaging machines for food products will be studied with reference to their technical, constructive, operational characteristics, and applying their adjustments depending on the input and output characteristics of the processed product.

SYLLABUS

Hrs	Frontal teaching
2	Presentation of the course, objectives and role of the agri-food plants for Mediterranean food conservation, transformation and processing
2	Technology cycle of production
2	Machines and wine-making plants. Weighing, sampling, measurement, discharge hopper and primary conveyor
4	De-stemming, crushing, draining machines, protected atmosphere and pumps
4	Must production, continuous and discontinuous presses, operating cycles
4	Machines for filtration: surface, depth, with deposit, with precoating, with filter layers, traditional tangential, tangential membrane, ultrafiltration and microfiltration, rotary vacuum filtration
2	The bottling plant: palletizing, washing, filling, capping, labeling, boxing and palletizing machines
2	Olive oil extraction plants. Weighing, sampling, discharge hopper and primary conveyor
6	Washing machines, crushing machines, malaxer, separation with decanter, centrifuge
2	Virgin olive oil storing, filtering and packaging
2	Heat preservation machines: heat exchangers, pasteurizers, sterilizers
2	Cold storage machines: chillers, freezing, deep freezing
4	Plants for table olives processing
2	Machines and plants for citrus fruits processing
2	Machines and plants for fruits and vegetables processing
4	Machinery and systems for fruit and vegetables conditioning for fresh consumption and ready-toeat. The cold chain. Packaging machines.
2	Advanced monitoring systems (Internet of Things) in the main production chains of the Mediterranean area

Hrs	Practice
12	Technical visits to Sicilian food and drink industries