UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	AGRIFOOD SCIENCES AND TECHNOLOGIES
INTEGRATED COURSE	PRINCIPLES OF AGRI-FOOD INDUSTRY ENGINEERING
CODE	18511
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	AGR/09, AGR/08
HEAD PROFESSOR(S)	BAIAMONTE GIORGIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	BAIAMONTE GIORGIO Professore Ordinario Univ. di PALERMO VALLONE MARIANGELA Professore Associato Univ. di PALERMO
CREDITS	9
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**BAIAMONTE GIORGIO** Monday 11:00 13:00 Dip. SAAF, Edificio 4, Ingresso E, piano 1°, stanza 126 Tuesday 11:00 13:00 Dip. SAAF, Edificio 4, Ingresso E, piano 1°, stanza 126 **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. GIORGIO BAIAMONTE

PREREQUISITES	Basics of physics and mathematics (physical quantities and units systems, vector, force, work, energy, basic trigonometry).
LEARNING OUTCOMES	Knowledge and understanding Knowledge of principles of machines and installations for agri food industry. Knowledge of principles of water supply and treatment and wastewater treatment and reuse. Basic knowledge of water regulations. Students will be able to use terminology specific of Agricultural Engineering. Applying knowledge and understanding Students will be able to solve practical problems involving choice of machines and installations for agricultural product transformations. Ability to manage water supply and treatment systems in agri food industry. Making judgements Students will be able to choose among different solutions for mechanization and for water treatment in agri food industry. Communication Students will be able to work as part of a team and to present the results in a professional way to other experts in the field of Agricultural Engineering. Lifelong learning skills Students will be able to attend specialist courses in the field of Agricultural Engineering, to keep u-to-date by examining the scientific literature of the specific sector and attending post-graduate courses.
ASSESSMENT METHODS	Final exam consists of a written test and an oral discussion on the subjects studied during the course with specific consideration of the practical exercises. A minimum of three questions will be posed to assess student's ability and autonomy in solving practical cases. Grades range from 18 to 30. Minimum mark (18) is reached when student shows a general knowledge and understanding of course subjects and ability to face very simple practical cases. Below this threshold the exam is not passed. The more the student will show knowledge and understanding of the subjects and autonomy in applying them to practical cases related to professional contest, the higher the mark will be.
TEACHING METHODS	The course consists of frontal lessons and practical exercises for at least 20% of the classes. Course includes technical visits to agri food industries.

MODULE
SOURCING, QUALITY AND WATER DISPOSAL IN THE AGRI-FOOD INDUSTRY

Prof. GIORGIO BAIAMONTE

SUGGESTED BIBLIOGRAPHY

Materiale didattico distribuito dal docente durante il corso.

AMBIT	10691-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60

EDUCATIONAL OBJECTIVES OF THE MODULE

The course of "Sourcing, quality and water disposal in the agri food industry" aims at giving the basic tools to manage water processes in agri food industry. The students will be introduced to water and wastewater quality, to hydraulic computation of pressurized pipes, open channels, pumping systems and control and regulation systems for blue and grey water. Then, the main elementary processes in blue and grey water treatment will be examined. The course is supplemented by practical exercises on hydraulic computation of basic parts of supply and treatment systems for agroindustrial plant.

SYLLABUS

Hrs	Frontal teaching
4	Physical, chemical and biological characteristics of drinking water and wastewater.
1	Drinking water and wastewater regulations
2	Water quality. Salinity and sodicity. Salt tolerance. Effect of saline-sodic waters on the structural and hydrological characteristics of soil.
4	Water supply and delivery systems. Regulation reservoir.
3	Collection and elaboration of hydrological data-series. Surface and ground water resources. Water reservoirs and their management in agri-food plants.
8	Pressurized pipe flow. Bernoulli equation. Hydraulic losses and resistance law. Hydraulic computation of short pipes.
4	Pumping systems. Pumps characteristics. Control and regulation systems.
2	Groundwater. Gravity Springs: depression springs; contact springs; and fracture or tubular springs. Artesian Springs. Spring collection system, Spring box and pipe arrangement, Drilled wells and dug wells. Testing Well Yield.
5	Management of primary waters for human uses. Mixing, coagulation and flocculation basins. Filtration. Disinfection.
4	Wastewater treatment processes. Primary and secondary treatments. Sedimentation. Activated sludge treatment. Sludge stabilization. Advanced treatment: filtration, disinfection.
2	Management of a wastewater treatment plant.
3	Advanced processes and treated wastewater reuse.

Hrs	Practice
2	Hydraulic computation of a regulation reservoir.
2	Hydraulic computation of a pressurized pipe.
2	Hydraulic computation of a pumping system.
2	Hydraulic computation of a granular filter.
2	Hydraulic computation of a settling basin.
4	Hydraulic computation of activated sludge reactor.
4	Technical visits to water treatment plants for agri food industries.

MODULE
MACHINES FOR AGRI-FOOD INSUSTRY

Prof.ssa MARIANGELA VALLONE

SUGGESTED BIBLIOGRAPHY	
D. Friso, 2013, Ingegneria dell'industria alimentare. Operazioni unitarie del food engineering. Macchine e impianti. CLEUP Appunti forniti dal docente	
AMBIT	10691-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30
EDUCATIONAL OBJECTIVES OF THE MODULE	
The course aims to provide basic knowledge on the main machines used for the execution of unitary operations in the agri-food industry. In particular, the machines of the agri-food industries for the processing and transformation of products of the Mediterranean basin will be studied.	

SYLLABUS

Hrs	Frontal teaching
2	Introduction: objectives, content, methods of examination. Introduction to the agro food plants
2	Mechanics of solids and fluids food
2	The main agri-food chains of the Mediterranean basin: wine, olive oil, table olives, fruit and vegetables
4	Handling system for liquid, solids, seed and dust
6	Heating and cooling systems in agro food plants
4	Machines for filtration, separation and sorting
4	Process control systems: sensors, controllers, actuators; logics.

Hrs	Practice
6	Technical visits to agri-food farms