UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2016/2017
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)	IOVINO MASSIMO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	IOVINO MASSIMO Professore Ordinario Univ. di PALERMO ORLANDO SANTO 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	**IOVINO MASSIMO** Thursday 09:00 13:00 Dipartimento di Scienze Agrarie, Alimentari e Forestali, Viale delle Scienze ed. 4, ingr. E, stanza n. 128 **ORLANDO SANTO** Monday 10:00 12:00 Dipartimento SAAF, Edificio 4, Ingresso L, Piano 1, Stanza 139 Tuesday 10:00 12:00 Dipartimento SAAF, Edificio 4, Ingresso L, Piano 1, Stanza 139 Friday 10:00 12:00 Dipartimento SAAF, Edificio 4, Ingresso L, Piano 1, Stanza 139

DOCENTE: Prof. MASSIMO IOVINO

PREREQUISITES	Basics of physics and mathematics (physical quantities and units systems, vector, force, work, energy, basics 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 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. MASSIMO IOVINO

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. Particular focus will be put on water regulations. 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.
2	Drinking water and wastewater regulations
4	Water supply and delivery systems. Regulation reservoir.
6	Pressurized pipe flow. Bernoulli equation. Hydraulic losses and resistance law. Hydraulic computation of short pipes.
2	Open-channel flow. Hydraulic computation of an open channel under uniform flow conditions.
4	Pumping systems. Pumps characteristics. Control and regulation systems.
6	Drinkable water treatments. Filtration. Disinfection.
6	Wastewater treatment processes. Primary and secondary treatments. Sedimentation. Activated sludge treatment. Sludge stabilization. Advanced treatment: filtration, disinfection.
2	Management of a wastewater treatment plant.
4	Mass and energy recover. Water saving and efficiency. Agricultural reuse. Energy from treatment sludge.

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

MODULE
MACHINES FOR AGRI-FOOD INSUSTRY

Prof. SANTO ORLANDO

SUGGESTED BIBLIOGRAPHY	
Lucidi delle lezioni, esercizi e altro materiale forniti dal docente D. Friso, 2013, Ingegneria dell'industria alimentare. Operazioni unitarie del food engineering. Macchine e impianti. CLEUP.	
AMBIT	10691-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30
EDUCATIONAL OBJECTIVES OF THE MODULE	
The aim of the course is to provide basic knowledge on the main machines and equipment used for the execution of the unit operations in the food industry especially referring to the regional food production.	

SYLLABUS

Hrs	Frontal teaching
2	Introduction: objectives, content, methods of examination. Introduction to the agro food plants
2	The materials in agro-food industries. Steels. Plastic polymers. Elastomers. Glass. Ceramic materials.
4	Handling system for liquid, solids, seed and dust
4	Heating and cooling systems in agro food plants
4	Machines for filtration, separation and sorting
4	Plants for production milk, dairy products; wine, oil, flou
4	Process control systems: sensors, controllers, actuators; logics.

Hrs	Practice
6	Visit of agro-food plants