



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze Agrarie, Alimentari e Forestali		
<b>ACADEMIC YEAR</b>	2019/2020		
<b>MASTER'S DEGREE (MSC)</b>	FIRM AND QUALITY FOR THE AGRICULTURAL AND FOOD SYSTEM		
<b>INTEGRATED COURSE</b>	ZOO-TECHNICAL WASTEWATER PLANTS AND MANAGEMENT		
<b>CODE</b>	18588		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	AGR/08, AGR/09		
<b>HEAD PROFESSOR(S)</b>	MORELLO GIUSEPPE	Ricercatore	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	IOVINO MASSIMO	Professore Ordinario	Univ. di PALERMO
	MORELLO GIUSEPPE	Ricercatore	Univ. di PALERMO
<b>CREDITS</b>	12		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<b>IOVINO MASSIMO</b> Thursday 09:00 13:00 Dipartimento di Scienze Agrarie, Alimentari e Forestali, Viale delle Scienze ed. 4, ingr. E, stanza n. 128		
	<b>MORELLO GIUSEPPE</b> Tuesday 10:00 12:00 Studio n.138 - edificio 4		

**DOCENTE:** Prof. GIUSEPPE MORELLO

<b>PREREQUISITES</b>	Basics of Agricultural Hydraulics (hydrostatics and hydrodynamics) and Agricultural mechanics.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding Knowledge of principles of machineries for livestock farm. Knowledge of principles of wastewater treatment. 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 machineries and wastewater treatment in livestock farming.</p> <p>Making judgements Students will be able to choose among different solutions for livestock farm mechanization and for wastewater treatment and reuse.</p> <p>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.</p> <p>Lifelong learning skills Students will be able to attend specialist courses in the field of Agricultural Engineering, to keep up-to-date by examining the scientific literature of the specific sector and attending post-graduate courses.</p>
<b>ASSESSMENT METHODS</b>	<p>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.</p> <p>Grades range from 18 to 30.</p> <p>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 context, the higher the mark will be.</p>
<b>TEACHING METHODS</b>	The course includes frontal lessons, practical exercises and guided tours.

## MODULE ZOOTECNICAL MACHINES AND PLANTS

*Prof. GIUSEPPE MORELLO*

### SUGGESTED BIBLIOGRAPHY

In aggiunta al materiale fornito dal docente si consiglia la consultazione dei seguenti testi:

Per approfondimenti possono essere consultati i seguenti testi:

L. Bodria, G. Pellizzi, P. Piccarolo - Meccanica Agraria - Edagricole

A. Guidobono Cavalchini - La mungitura. Tecnologie, scelta e gestione degli impianti - Edagricole

A. K. Srivastava, C. E. Goering, R. P. Rohrbach - Engineering principles of agricultural machinery - ASAE

Siti web:

<http://www.ruminantia.it/>

<http://www.informatorezootecnico.it/>

<http://www.suinicoltura.it/>

<http://www.iszsicilia.gov.it/>

<http://www.istat.it/it/archivio/zootecnia>

<b>AMBIT</b>	50546-Discipline della ingegneria agraria
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60

### EDUCATIONAL OBJECTIVES OF THE MODULE

#### OBJECTIVES OF THE COURSE

The course aims to provide basic knowledge, theoretical and practical, on the management and evaluation of the machines used in livestock farms.

teaching methods

The course consists of lectures in the classroom which illustrates the components of the animal husbandry machinery and plant, the selection criteria according to business characteristics, the principles for the proper management and maintenance of machines and plants.

For example, classes are associated exercises in the classroom and in the laboratory concerning the selection and evaluation of machines and installations used in livestock farms, the assessment of the requirements for a use which meets the safety criteria, the laboratory tests to verify the equipment machine safety. Guided tours to construction companies and livestock farms can be programmed.

## SYLLABUS

Hrs	Frontal teaching
4	GENERALITY. Short description of the course and the program. The procurement of teaching materials and the recommended texts. The main physical quantities and their units used in the description of machinery and interest in plants.
6	THE TRACTOR AND MACHINES THE FARM LIVESTOCK. The main machines of interest in company livestock. The tractor-machines connection. Power outlet. hydraulic lift.
6	THE SAFETY OF THE MACHINES. Requirements of the operating machines safety. The operation of the machines, working and operational capacity times.
6	MACHINES FOR CUTTING AND HAY. Cutting machines: a blade mowers, rotary mowers. Tedding equipment: tedders, rakes. Machines for harvesting forage. Harvesting machines of pressed forage: Packing plunger, round baler, packing giant. Machines for the pressed forage management.
4	MACHINES FOR THE COLLECTION OF GRAIN. Mower-shredder-loaders. Conventional combines and axial flow.
8	MACHINERY AND EQUIPMENT FOR THE PREPARATION, STORAGE AND DISTRIBUTION OF FOOD. Equipment for drying fodder. Plants for silage fodder. The grinding of food. Machines for the preparation of food, feed mixers. Machines for the distribution of food.
6	MACHINERY AND EQUIPMENT FOR THE MILKING. Milking parlor. Milking machines. Milking robot. Refrigeration and storage of milk.
5	Machinery and systems for the management of livestock waste. Management and agronomic practices to reduce nitrogen emissions to water. Environmental conditioning in the stables. Precision animal husbandry. Animal welfare. Notes on the BDN.
Hrs	Practice
5	Exercises
Hrs	Others
10	TECHNICAL VISITS TO ENTERPRISES LIVESTOCK

**MODULE**  
**SEWAGE MANAGEMENT IN ZOO-TECHNICAL PLANTS**

*Prof. MASSIMO IOVINO*

**SUGGESTED BIBLIOGRAPHY**

Materiale didattico fornito dal docente durante il corso.

<b>AMBIT</b>	50546-Discipline della ingegneria agraria
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The course of "Seewage management in zoo technical plants" aims at giving the basic tools to manage zootecnical wastewater treatment plants. The students will be introduced to the environmental problems related to water bodies pollution (surface water and groundwater) and the technical facilities to treat wastewater. Particular focus will be put on the reuse of treated wastewater for irrigation and the related regulations. The course is supplemented by practical exercises on basic parts of a wastewater treatment plant.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
4	Water cycle. Overview on soil and water pollution. Nitrogen cycle and eutrophic state of a water body. Nitrogen regulations.
6	Wastewater systems in a livestock farm. Pressurized and open-channel flow. Pumping systems. Control and measurement of water flow.
4	Wastewater characteristics. Total solid load, suspended solids. Organic load: BOD, COD. Nitrogen and Phosphorous. Wastewater quality limits. Wastewater reuse in agriculture. Regulations.
2	Layout of a wastewater treatment plant for livestock farm.
4	Primary treatments. Equalization tank. Sieving and sedimentation.
6	Secondary treatments. Aerobic and anaerobic biological treatments. Activated sludge treatments. Aeration requirements. Lagoons.
2	Biological denitrification. Chemical removal of phosphorus. Nitrification-denitrification basins.
2	Advanced treatments. Filtration. Membrane biological reactor (MBR). Disinfection.
4	Wastewater sludge treatment. Aerobic and anaerobic digestion. Biogas production. Disidratation and final disposal of wastewater sludge.
2	Management of a wastewater treatment plant.
2	Wastewater treatment and reuse guidelines and restrictions.
2	Wastewater disposal on agricultural soil: effect on soil physical and chemical characteristics.
<b>Hrs</b>	<b>Practice</b>
20	General planning of a wastewater treatment plant for a livestock farm. Technical visit to a treatment plant.