



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Ingegneria
<b>ACADEMIC YEAR</b>	2022/2023
<b>MASTER'S DEGREE (MSC)</b>	ENGINEERING AND INNOVATIVE TECHNOLOGIES FOR THE ENVIRONMENT
<b>SUBJECT</b>	COMPLEMENTS OF ENVIRONMENTAL HYDRAULICS
<b>TYPE OF EDUCATIONAL ACTIVITY</b>	B
<b>AMBIT</b>	50372-Ingegneria per l'ambiente e territorio
<b>CODE</b>	08999
<b>SCIENTIFIC SECTOR(S)</b>	ICAR/01
<b>HEAD PROFESSOR(S)</b>	NAPOLI ENRICO          Professore Ordinario          Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	
<b>CREDITS</b>	9
<b>INDIVIDUAL STUDY (Hrs)</b>	144
<b>COURSE ACTIVITY (Hrs)</b>	81
<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>NAPOLI ENRICO</b> Thursday 12:00 13:30 Ufficio Enrico Napoli - Secondo piano Friday 12:00 13:30 Ufficio Enrico Napoli - Secondo piano

DOCENTE: Prof. ENRICO NAPOLI

<b>PREREQUISITES</b>	Basic Fluid mechanics knowledge. Steady-state pipe and channel flows.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding skills. The student will deepen the skills achieved in the basic hydraulic courses, improving the knowledge of complex hydrodynamic problems.</p> <p>Skills to apply knowledge and understanding Main objective of the course is to provide the students with advanced skills in the analysis of hydrodynamic processes relevant in environmental engineering.</p> <p>Making judgments The variety and complexity of the problems discussed during the course requires that the student achieves the ability to combine the solution of specific methodologies independently of each addressed problem.</p> <p>Communication skills During the exercises in the classroom and in the lab, the student will be invited to discuss the used procedures and methodologies, thus acquiring the ability to explain the meaning of their work. Such capacity will be directly evaluated in the final exam.</p> <p>Learning skills The provided knowledge will allow the students to analyze and study complex hydraulic engineering problems (other than those covered in the course), thus acquiring the ability to further deepen their expertise throughout their subsequent professional or university experience.</p>
<b>ASSESSMENT METHODS</b>	<p>Oral test. The oral examination consists of the discussion of the reports of the practice exercises and of the basic principles of environmental fluid mechanics.</p> <p>The final assessment takes into account equally the quality of the reports and of the oral tests and is based on the following requisites: a) knowledge and presentation skills of the fundamental principles; b) ability to apply the principles to practical problems ; c) skills in solving new problems.</p> <p>The examination is passed if the student meets the requirement a) and, at least for simple problems, the requirement b). The requirement c) is a necessary condition to obtain an excellent rating ( 28 and up). The score is given in thirtieths.</p> <p>The examination method is independent on the course attendance.</p>
<b>EDUCATIONAL OBJECTIVES</b>	The course aims to provide students with advanced skills in the field of Fluid Mechanics, with particular reference to the most important issues that the graduates in the Master's Degree in Environmental and Land Engineering will face in the future professional activity. In particular, the aim is to provide the expertise needed to solve problems related to the most important hydraulic infrastructures and to the analysis of free-surface natural water bodies (rivers, lakes, coastal waters).
<b>TEACHING METHODS</b>	Lectures and exercises
<b>SUGGESTED BIBLIOGRAPHY</b>	Curto – Napoli. Idraulica Vol 1 e Vol. 2 (2005-2007). Editrice BIOS. ISBN-10 : 8877403853 Dispense a cura del docente

## SYLLABUS

Hrs	Frontal teaching
6	Unsteady oscillatory and elastic flows
5	Steady Free-surface flows and Weirs
4	Unsteady channel flows
3	Groundwater flows
6	Turbulence modelling
3	Advection-diffusion equation
6	Basic computational fluid dynamics
3	Elements of hydrodynamics of oceans and atmosphere
4	Coastal water processes
Hrs	Practice
6	Basic Matlab Programming
5	Exercises on the water hammer
3	Exercises on channel flows with weirs
3	Exercises on unsteady free-surface flows
8	Exercises on turbulence modelling
5	Exercises on tracer transport
12	Exercises on coastal hydrodynamic processes