



FUNDAMENTALS OF HYDRAULICS

Enrollment year	2019/2020
Academic year	2020/2021
Regulations	DM270
Academic discipline	ICAR/01 (HYDRAULICS)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	CIVIL AND ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	1st semester (28/09/2020 - 22/01/2021)
ECTS	6
Lesson hours	52 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	SIBILLA STEFANO (titolare) - 5 ECTS FENOCCHI ANDREA - 1 ECTS
Prerequisites	Fundamentals of calculus: limits, derivatives, integrals. Mechanics: equilibrium, energy, conservation principles. Analytical mechanics: vector calculus.
Learning outcomes	At the end of the Course, the student should know and understand the basic principles which regulate the liquid motion in pipes and open channels. He must also be able to apply these principles to the solution of simple hydraulic engineering problems, such as the evaluation of the force exerted by the liquid on the rigid walls, the determination of discharge and head losses in pipe flows, the evaluation of energy exchanges between liquid flows and hydraulic machines.
Course contents	Fluids as a continuum. Pressure and viscous stress. Hydrostatics: Stevin's Law and pressure distribution in liquids. Pressure measurement. Hydrostatic forces on plane and curved walls.

	Kinematics of liquids: Eulerian and Lagrangian point of view. Definition of flow lines, fluxes, flow rate and mean velocity. Hydrodynamics: conservation principles. Continuity equation and Bernoulli's Theorem. Head losses: laminar and turbulent flows. Pipe flows: smooth wall and roughness, Moody's chart. Effects of geometry variation. Valves. Hydraulic machines: pumps and turbines. Typical layout of hydropower plants.
Teaching methods	Lectures and practical classes
Reccomended or required readings	Gallati M., Sibilla S. . Fondamenti di Idraulica. Carocci editore, Roma. Citrini D., Nosedà D.. Idraulica. Tamburini, Milano.
Assessment methods	The evaluation will be obtained through a written test, which will include in general the solution of two exercises, the first on the evaluation of hydrostatic forces and the second on the solution of a problem on pipe flows (e.g.: determination of the flow rate and of head losses, energy exchanges in hydropower or pumping plants, etc.) The test will last for 2 hours: the use of textbooks, tables and computing machines is allowed. The evaluation will be given in a 0-30 grade scale.
Further information	
Sustainable development goals - Agenda 2030	\$lbl_legenda_sviluppo_sostenibile