UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

ENVIRONMENTAL PHYSICS AND HYDRAULIC SYSTEMS

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (28/09/2020 - 22/01/2021)
ECTS	9
Language	Italian
Prerequisites	Principles of thermodynamics and heat transfer
Learning outcomes	The objectives of the course are to deepen the basic knowledge acquired in engineering education, providing useful tools for the application of the theory to technical problems.
Course contents	The details are contained in the programs of the two modules
Teaching methods	The details are contained in the programs of the two modules
Reccomended or required readings	The information is indicated in the program of the two modules
Assessment methods	The information is indicated in the program of the two modules
Further information	The course provides advanced skills for understanding and solving problems to reach the targets indicated by the 2030 Agenda on Sustainable Development. In particular, theoretical contents and practical applications address topics related to Goal 7 (Clean and accessible energy), Goal 11 (sustainable cities and communities), Goal 12 (responsible consumption and production), Goal 13 (fight against climate change)

The activity is split

503009 - **ENVIRONMENTAL PHYSICS**

503010 - **HYDRAULIC MACHINES**

UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

ENVIRONMENTAL PHYSICS

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	ING-IND/11 (ENVIRONMENTAL TECHNICAL PHYSICS)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	(28/09/2020 - 22/01/2021)
ECTS	6
Lesson hours	60 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	MAGRINI ANNA (titolare) - 6 ECTS
Prerequisites	Knowledge of Physics and Technical Physics is required
Learning outcomes	The course is aimed at engineering students to improve their knowledge about noise pollution, its reduction in urban areas, and about environmental effects of the building energy consumption. The control of air pollutant emissions, particularly CO2, may be performed at the source, by reducing energy consumption in buildings. Energy performance calculations, and use of solar energy to reduce heating loads in buildings are considered. The student will have the basis knowledge about analysis of the feasibility of reducing energy consumption in buildings and the use of solar collectors. They will have means to design and monitoring indoor and outdoor noise pollution reduction
Course contents	Noise Pollution Noise propagation principles. Sound absorption, materials, noise

	reduction by means of barriers. Outdoor environment: noise sources in urban areas, classification of noise, noise measurements and evaluation criteria, analysis of actions to reduce noise. Plans to safeguard environmental quality, environmental protection against noise. Analysis of geomorphological, meteorological, anthropological and settlement characteristics of the territory. Noise sources and mapping in terms of noise pollution. Methods of intervention for the noise reduction in highly polluted areas. Energy performance of buildings Methods for evaluation of energy performance. Energy balance and international-national standards. Energy-saving technologies: solutions for the building envelope and systems to reduce energy consumption in buildings. Solar energy Energy saving is also based on better exploitation of natural resources. The use of solar water heaters offers good ideas for reducing fuel consumption and pollutants into the atmosphere. Evaluation of the solar energy that can be used. Common types and innovative solar panels. Hydraulic system and possibility of use as hot water and support heating systems. Analysis of achievable energy savings . Calculation methods of the benefits of collectors and water heating solar systems. Installation design.
Teaching methods	Lectures (hours/year in lecture theatre): 60 Practical class (hours/year in lecture theatre): 0 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	Videolessons, teaching material and tests on KIRO website A.Magrini. Progettare il silenzio. EPC Libri, 2003. . I.Sharland. Manuale di acustica applicata. Woods Italia 1980. . A.Magrini, L.Magnani. Fisica Tecnica, Volume II - Esempi di calcolo di psicrometria, acustica e illuminotecnica. Città Studi Edizioni.---------- A.Magrini. La progettazione degli impianti di climatizzazione negli edifici. EPC Libri 2002.---------- A.Magrini, D.Ena. Tecnologie solari attive e passive. EPC Libri 2005.--
Assessment methods	The final verification is represented by a written test (normally in the computer room) and an oral exam (usually the day after the written test) in the dates fixed in the calendar. It is possible to carry an exercise (optional) on the application of concepts. The mode of execution and delivery of the exercise, the access to educational materials are given in the teacher's web page. Video lessons and exames with solution are available on Kiro web site.
Further information	The course provides advanced skills for understanding and solving problems to reach the targets indicated by the 2030 Agenda on Sustainable Development. In particular, theoretical contents and practical applications address topics related to Goal 7 (Clean and accessible energy), Goal 11 (sustainable cities and communities), Goal 12 (responsible consumption

	and production), Goal 13 (fight against climate change)
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile

UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

HYDRAULIC MACHINES

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	ING-IND/08 (FLUID MACHINES)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	(28/09/2020 - 22/01/2021)
ECTS	3
Lesson hours	28 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	BARBERO GIUSEPPE - 3 ECTS
Prerequisites	Mass conservation, energy conservatio, momentum conservation equations. Pipe flow: Bernoulli theorem, friction loss, head loss, ecc. Basic knowledge of relative motion.
Learning outcomes	The aim of the hydraulic machines course is to illustrate the main constructional and operational characteristics of the machines operating with incompressible fluids (pumps and hydraulic turbines) of major industrial interest. Particular attention is paid to the criteria for the choice of the machines, to the methods of regulation and to the interaction between machine and plant, in order to optimize their use.
Course contents	Hydraulic machines: pumps and turbines General principles Principles of conservation of mass, momentum and energy. Adiabatic motion of incompressible fluids in the variable section

	ducts. Relative motions, Euler equation. Hydraulic pumps Classification, fields of operation and selection criteria of the pumps. Operating quantities of the pumps: prevalence, efficiency and nominal power. Pump-system interaction, pump and system characteristic curves. Coupling of pumps in series and parallel. Operation in off-project conditions. Cavitation in the pumps, NPSH required. Hydraulic similarity. Dependency of the geometry of the machine with the required performances. Hydraulic turbines General information on hydroelectric plants and storage systems. The Pelton, Francis and Kaplan turbines: operational characteristics and selection criteria.
Teaching methods	Frontal lessons (hours/years): 16 Exercises (hours/years): 12 Pratical activities (hours/years): 0
Reccomended or required readings	Lecture notes by the teacher G. Cornetti. Macchine Idrauliche. Il Capitello - Torino. Dossena, G. Ferrari, P. Gaetani, G. Montenegro, A. Onorati, G. Persico MACCHINE A FLUIDO Seconda edizione CittàStudi Milano
Assessment methods	The course final exam consists of a written test and an oral exam (usually the day after the written test) to be held on the scheduled dates.
Further information	=
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile