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 CO_2, 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