

UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	ARCHITECTURE
SUBJECT	ENVIRONMENTAL TECHNICAL PHYSICS
TYPE OF EDUCATIONAL ACTIVITY	A
АМВІТ	50662-Discipline fisico-tecniche ed impiantistiche per l'architettura
CODE	03324
SCIENTIFIC SECTOR(S)	ING-IND/11
HEAD PROFESSOR(S)	BECCALI MARCO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	18528 - MATHEMATICS 1 AND 2 - INTEGRATED COURSE
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	BECCALI MARCO
	Thursday 09:30 11:00 T 208, ed. 9

DOCENTE: Prof. MARCO BECCALI

PREREQUISITES	Basic knowledge of maths and physics
LEARNING OUTCOMES	Knowledge and understanding: Knowledge of physical and environmental phenomena and of the technologies necessary to make buildings comfortable, also in relation to their function. Ability to understand problems and technical design solutions with particular reference to energy aspects. Acquisition of basic knowledge of applied physics (quantities and units of measurement, thermodynamics, heat transmission, elements of fluid motion, lighting technology, acoustics).
	Ability to apply knowledge and understanding: Acquisition of methodological tools and reference data to intervene with analytical skills where problems of environmental control, energy control, lighting and acoustics have to be dealt with. Learning of technical regulations and legislation regarding the energy performance of the building and energy certification. Knowing how to quantitatively evaluate environmental comfort.
	Autonomy of judgment: Discriminating between regulatory obligations and degrees of design freedom in the analysis of architectural projects.
	Communication skills: Knowing how to relate to the different skills involved in the design process. Knowing how to demonstrate the environmental and energy quality of the designed building.
	Learning skills: On the basis of the acquired knowledge, the student will be able to deepen his knowledge from sources present in the scientific literature and from subsequent teachings.
	Furthermore, the student will be able to learn new methods of approach to energy and environmental problems and to face new issues against the background of environmental sustainability, allowing him to continue his studies with greater autonomy and discernment.
ASSESSMENT METHODS	During the course, when lectures are suspended, there will be two written tests (mid-term and final testing) relating to the topics.
	There will be at least 10 question per test. Questions need either closed and open answers. Each answer must be adequately commented. The teacher will assess: basic knowledge, mastery of language and the capacity to build relationships among theory and practical applications. Students that will fail one or both the written test can have access to an oral examination related to the failed test topics.
	Final mark will be a synthesis of the two ranked in the tests (arithmetic average) of the results obtained in the written tests and oral tests (relating to the topics of the written tests not passed by the students).
	Rating votes: excellent 30/30 e lode: excellent knowledge of the topics, excellent mastery of language, good analytic capability; the student is able to apply his knowledge to solve the proposed problems.
	Very good 26-29: good knowledge of the subjects, full mastery of language, the student is able to apply knowledge to solve the proposed problems.
	Good 24-25: basic knowledge of the main topics, basic command of language, limited ability to independently apply the knowledge to the solution of the proposed problems
	satisfactory 21-23: the student does not have full capabilities but has the knowledge, satisfactory command of language, poor ability to independently apply the knowledge
	sufficient 18-20: student has minimal knowledge of topics and minimal technical language, very little or no ability to independently apply the knowledge insufficient: the student does not have an acceptable knowledge of the topics
EDUCATIONAL OBJECTIVES	The course aims to provide basic knowledge about energy, heat, light and sound laws. In detail, first topics deal with thermodynamics (quantity and quality of energy)and heat and moisture transfer. Afterwards, thermal comfort, light and sound fundamentals will give the knowledge to assess the quality of close spaces. Moreover, standards and procedures for energy certification of buildings will be studied.

TEACHING METHODS	Lectures, excercise in team working	
SUGGESTED BIBLIOGRAPHY	Slides e dispense distribuite dal docente (Notes and slides distributed by the teacher) Fisica Tecnica Ambientale – Yunus A. Cengel (G. Dall'O', L. Sarto), McGraw-Hill Magrini A, Maggioni L.: La progettazione degli impianti di climatizzazione negli edifici, EPC Libri	
SVLLABUS		

STLLABUS		
Hrs	Frontal teaching	
1	Introduction (energy, environment and architecture)	
4	Fundamentals of applied physics: heat, energy, power and their units	
8	Thermodynamics	
8	Heat transfer in stationary conditions: conduction, convection, radiant transmission	
4	Properties of construction materials. Insulating materials. U value	
6	Italian Standards and Laws for energy performances of buildings. Energy certification	
4	Thermal comfort in indoor spaces. Indoor Air Quality	
8	Fundamentals of lighting. Visual comfort	
5	Acoustics for architecture	
Hrs	Practice	
6	Design of thermal insulation and control vapour condensation in vertical walls, Calculation of reverberation time, calculation of illuminance values	