



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Architettura
<b>ACADEMIC YEAR</b>	2023/2024
<b>MASTER'S DEGREE (MSC)</b>	ARCHITECTURE
<b>SUBJECT</b>	ENVIRONMENTAL TECHNICAL PHYSICS
<b>TYPE OF EDUCATIONAL ACTIVITY</b>	A
<b>AMBIT</b>	50662-Discipline fisico-tecniche ed impiantistiche per l'architettura
<b>CODE</b>	03324
<b>SCIENTIFIC SECTOR(S)</b>	ING-IND/11
<b>HEAD PROFESSOR(S)</b>	BECCALI MARCO      Professore Ordinario      Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	
<b>CREDITS</b>	6
<b>INDIVIDUAL STUDY (Hrs)</b>	96
<b>COURSE ACTIVITY (Hrs)</b>	54
<b>PROPAEDEUTICAL SUBJECTS</b>	18528 - MATHEMATICS 1 AND 2 - INTEGRATED COURSE
<b>MUTUALIZATION</b>	
<b>YEAR</b>	2
<b>TERM (SEMESTER)</b>	1° semester
<b>ATTENDANCE</b>	Not mandatory
<b>EVALUATION</b>	Out of 30
<b>TEACHER OFFICE HOURS</b>	<b>BECCALI MARCO</b> Thursday 09:30 11:00 T 208, ed. 9

DOCENTE: Prof. MARCO BECCALI

<b>PREREQUISITES</b>	Basic knowledge of maths and physics
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding            Knowledge of physical and environmental phenomena, as well as technologies, required for make buildings efficient and comfortable. Understanding problems and find design solutions in particular dealing with energy uses. Learning of fundamentals of applied physics (units, thermodynamics, heat and mass transfer, acoustics, lighting). Learning of analysis ability.</p> <p>Applying knowledge and understanding            Learning of methods and tools able to fulfil design objectives related to indoor thermal comfort, visual comfort, energy uses. Knowledge of laws and standards about energy performances of buildings and energy certification.</p> <p>Making Judgements            To be able to assess "energy and environmental qualities" of the built environment. To be able to understand how architecture features interact with the previous requirements. Make own design choices not only considering standards guidelines and limitations.</p> <p>Communication skills            Team working with other professionals and stakeholders. Approach holistic design. Go ahead "greenpainting" of projects: be confident of analysis and calculations to support the quality of the project.</p>
<b>ASSESSMENT METHODS</b>	<p>During the course, when lessons are suspended, an ongoing test relating to the topics covered is scheduled.            The test will include at least ten questions each with closed or open answers. Each answer will have to be adequately reasoned. Overall, basic knowledge, mastery of language, the ability to relate theoretical concepts to application problems will be verified.            Students who do not pass the ongoing test will be able to take the oral exam on the part of the program they did not pass through the written test.            The final mark will then be formulated through a summary (arithmetic mean) of the results obtained in the written tests and in the eventual oral tests (relating to the topics of the written tests not passed by the students).            The final exam will be oral.            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</p>
<b>EDUCATIONAL OBJECTIVES</b>	<p>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.</p>
<b>TEACHING METHODS</b>	Lectures, exercise in team working
<b>SUGGESTED BIBLIOGRAPHY</b>	<p>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</p>

## SYLLABUS

Hrs	Frontal teaching
1	Introduction (energy, environment and architecture)
3	Fundamentals of applied physics: heat, energy, power and their units
8	Thermodynamics
8	Heat transfer in stationary conditions: conduction, convection, radiant transmission
6	Properties of construction materials. Insulating materials. U value

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<b>Hrs</b>	<b>Frontal teaching</b>
4	Italian Standards and Laws for energy performances of buildings. Energy certification
4	Thermal comfort in indoor spaces. Indoor Air Quality
6	Fundamentals of lighting. Visual comfort
6	Acoustics for architecture
<b>Hrs</b>	<b>Practice</b>
8	Design of thermal insulation and control vapour condensation in vertical walls, Calculation of reverberation time, calculation of illuminance values