UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	BUILDING ENGINEERING
SUBJECT	HVAC & BUILDING SYSTEMS
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50355-Edilizia e ambiente
CODE	03884
SCIENTIFIC SECTOR(S)	ING-IND/11
HEAD PROFESSOR(S)	SCACCIANOCE GIANLUCA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**SCACCIANOCE GIANLUCA** Monday 11:00 13:00 Stanza T212, 2° piano del Dipartimento di Energia, ingegneria dell'Informazione e modelli Matematici (DEIM),Ingresso "Fisica Tecnica", viale delle scienze edificio 9. Tuesday 12:00 14:00 Stanza T212, 2° piano del Dipartimento di Energia, ingegneria dell'Informazione e modelli Matematici (DEIM),Ingresso "Fisica Tecnica", viale delle scienze edificio 9.

DOCENTE: Prof. GIANLUCA SCACCIANOCE

TEACHING METHODS	Teaching is organised in theoretical lectures and exercises, aimed at applying the learned knowledge through numerical exercises. The exercises will cover applications of the theoretical knowledge to the solution of real problem.
ASSESSMENT METHODS	Oral examination. The interview is aimed at determining the student's ability to process the knowledge gained by using them to solve problems and the ability to express the teaching content using a technically correct language. The vote is expressed in thirtieths with possible praise, according to the scheme reported at the bottom of the degree program homepage, i.e. "Metodi di valutazione".
LEARNING OUTCOMES	Knowledge and understanding Knowledge regarding: - laws and technical rules on water and sanitary systems; - laws and technical rules on HVAC systems; - types of technical schemes of examined systems; - types of equipment available on the market; - assessment methods of energy and hot water consumptions; - sizing methods of plant components. The understanding regarding: - The design of technical systems for the building; - The issues in the technical design choices. Applying knowledge and understanding The skills transferred to the student are: - assessment of the domestic hot water consumption of a building; - sizing of the components of a water and sanitary system; - assessment of energy consumption for heating of a building; - assessment of energy consumption for cooling of a building; - sizing of the components of a heating system; - sizing of the components of an air conditioning system. Making judgements At the end of the course, students will have acquired the ability to single out the most appropriate technical solutions for each specific question in the field of technical installations, evaluating the effectiveness of different design solutions. Communication The students will have acquired the ability to communicate and express issues concerning the buildings' technical facilities, dealt with in course, in order to also be able to converse with the other figures involved in the design and installation processes. Learning skills Based on the gained knowledge, the student will be able to learn from sources from the scientific literature and keep abreast of new techniques and new best available technologies.
EDUCATIONAL OBJECTIVES	The aim of the course is to provide the fundamentals: - for basic design concerning water and sanitary systems, heating and cooling plants, heating ventilation and air conditioning plants (HVAC); - reference standards on mechanical systems for buildings; - connections among mechanical systems for buildings and energy efficiency.
PREREQUISITES	Heat Transfer; Thermodynamics; Fluid mechanics
SUGGESTED BIBLIOGRAPHY	- G.Alfano, M.Filippi, E.Sacchi, Impianti di Climatizzazione per l'edilizia - Dal progetto al collaudo, Ed. MASSON - C.Pizzetti, Condizionamento dell'aria e refrigerazione - Teoria e calcolo degli impianti, Ed. Tamburini - ASHRAE, HVAC Systems and Equipment 2012: SI Edition: Heating, Ventilating, and Air-Conditioning Systems and Equipment, Amer Society of Heating; Har/Cdr edizione - Gallizio, Impianti sanitari, Hoepli - Dispense del docente (booklets)

SYLLABUS

Hrs	Frontal teaching
3	Notes on heat transfer: conduction, convection and radiation
6	Water and sanitary systems: supply and exhaust
6	Psychrometry and processes
4	Thermal comfort, heating and cooling loads
6	Basic heating ventilation and air condition plant typologies, air duct and hydraulic systems, indoor air quality, air cleaning systems and air outlets

SYLLABUS

Hrs	Frontal teaching
3	Chillers, heat pumps, boilers and regulation and control systems

Hrs	Practice
2	Exercise on heat transfer
4	Exercise on water and sanitary system: supply and exhaust
8	Exercise on psychrometry
12	Exercise on the evaluation of heating and cooling loads, sizing of air ducts and water pipes