



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	CIVIL ENGINEERING
SUBJECT	GEO-THERMAL AND BIOMASS PLANTS
TYPE OF EDUCATIONAL ACTIVITY	D
AMBIT	20558-A scelta dello studente
CODE	19653
SCIENTIFIC SECTOR(S)	ING-IND/10
HEAD PROFESSOR(S)	CURTO DOMENICO Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	GEO-THERMAL AND BIOMASS PLANTS - Corso: ENERGETIC AND NUCLEAR ENGINEERING GEO-THERMAL AND BIOMASS PLANTS - Corso: INGEGNERIA ENERGETICA E NUCLEARE
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	CURTO DOMENICO Monday 11:00 12:00 Aula docente: Ed. 9, aula 2010 (S09P2011) Wednesday 10:00 12:00 Aula docente: Ed. 9, aula 2010 (S09P2011) Friday 10:00 12:00 Aula docente: Ed. 9, aula 2010 (S09P2011)

DOCENTE: Prof. DOMENICO CURTO

PREREQUISITES	No requirements
LEARNING OUTCOMES	<p>Knowledge and ability to understand: At the end of the course the student will have acquired knowledge on the technologies regarding geothermal and biomass systems and also on thermal exchange.</p> <p>Method of assessment: theoretical questions in the context of the oral interview.</p> <p>Ability to apply knowledge and understanding: The student will have the ability to apply knowledge and methodologies acquired for conducting analyzes on geothermal and biomass systems,</p> <p>Assessment methods: practical questions and applications in the interview oral.</p> <p>Autonomy of judgment: The student will be able to evaluate different systems condition in accordance with geothermal and biomass systems</p> <p>Method of assessment: analysis (within the oral interview) of the mode of interpret the practical problems in the light of the theoretical principles studied, identifying those more 'adherent to the specifics of the situation examined.</p> <p>Communication skills: The student will be able to communicate with competence and properties of language regarding complex problems concerning thermal exchange, storage and geothermal or biomass systems</p> <p>Method of assessment: analysis (within the oral interview) of the properties of language and of the ability to express correctly simple and more complex concepts.</p> <p>Learning skills The student will be able to acquire, thanks to the skills acquired and through further third level training or directly in the field of biomass and geothermal systems</p>
ASSESSMENT METHODS	<p>Evaluation is made with a final oral exam.</p> <p>The student will have to answer, within the final interview, to a minimum of three questions on the topics covered by the course.</p> <p>The test is aimed at ascertaining the possession of skills and knowledge disciplinary measures foreseen by the course, and tends to verify the comprehension of the topics, interpretative competence, processing and exhibition skills e autonomy of judgment in practical applications.</p> <p>The threshold of sufficiency will be reached when the student shows knowledge and understanding of topics at least in the main lines and have the ability to correctly tackle at least simple applications; the student must also possess sufficient exhibit and argumentative capacities, such as to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient.</p> <p>The final interview concerning all the topics of the course has a duration of about 30 minutes. The evaluation is in thirtieths:</p> <p>Excellent 30 - 30 and praise: Excellent knowledge of the topics, excellent properties of language, good analytical skills, the student is able to apply the knowledge to solve the proposed problems,</p> <p>Very good 26 - 29: Good command of the subjects, full ownership of language, the student is able to apply the knowledge to solve the problems proposed problems.</p> <p>Good 24 - 25: Basic knowledge of the main topics, good property of language, with limited ability to autonomously apply knowledge to solve the proposed problems.</p> <p>Satisfactory 21 - 23: Does not have full mastery of the main topics of teaching but has the knowledge, satisfying properties language, poor ability to autonomously apply knowledge acquired.</p> <p>Sufficient 18 - 20: Minimum basic knowledge of the main topics of teaching and technical language, very little or no ability to apply the acquired knowledge independently.</p> <p>Insufficient: Does not possess an acceptable knowledge of the contents of topics covered in teaching</p>
EDUCATIONAL OBJECTIVES	The suitable knowledge of the methodological-operational aspects related to geothermal and biomass systems and the ability to use this knowledge to interpret and describe the practical problems concerning these kind of systems
TEACHING METHODS	Frontal lessons. Application or numerical examples will be developed within lessons
SUGGESTED BIBLIOGRAPHY	Appunti del docente - Fundamental of renewable energy processes - Aldo Vieira Da Rosa, Juan Carlos Ordonez ISBN-10 : 0128160365

SYLLABUS

Hrs	Frontal teaching
2	Concepts of geothermal energy
5	Geothermal systems: definition and classification of geothermal resources

SYLLABUS

Hrs	Frontal teaching
6	Sensitive, latent heat storage systems and thermochemical storage systems
4	Regulatory framework for geothermal plants
4	High enthalpy geothermal systems
6	Low enthalpy geothermal systems: geothermal heat pumps for environmental air conditionin
2	Biomass
4	Biomass legislation: possible incentives for biomass-powered plants, high-efficiency cogeneration, European Directive 2009/28/CE
4	Energy aspects of biomass from wood: efficient combustion and heat transmission methods
4	Biomass cogeneration plants: Mobile grid boilers combined with Orc turbines
4	Types of biomass and main technologies for energy conversion
3	Geothermal and biomass plant
Hrs	Practice
6	Sensitive heat storage systems: simulation with Transys