UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2017/2018
MASTER'S DEGREE (MSC)	MECHANICAL ENGINEERING
SUBJECT	ENERGY MANAGEMENT
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50370-Ingegneria meccanica
CODE	03722
SCIENTIFIC SECTOR(S)	ING-IND/10
HEAD PROFESSOR(S)	PIACENTINO ANTONIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**PIACENTINO ANTONIO** Monday 11:30 13:30 Stanza T121 - 1° piano Edificio n 9, Dipartimento di Ingegneria

DOCENTE: Prof. ANTONIO PIACENTINO

PREREQUISITES	None
LEARNING OUTCOMES	Knowledge and capability to understand: At the end of the course, the student will have acquired a knowledge of the technologies and solutions to achieve energy savings, and on the comprehensiveness of evolutive scenarios both at a high level (related with energy policy and planning) and at low level (for the specific and individual applications in the residential, tertiary and industrial sectors). Assessment: during the oral examination, by questions focused on theoretical aspects. Applying knowledge and understanding: The student will be able to apply the principles, concepts and methods learned to conduct simple energy and economic analyses, as well as comparisons between alternative technological solutions to supply the energy requests of some specific types of customers and energy users. The student will be able to address, autonomously, energy management problems and to analyse documentation related to energy supply (bills for gas and electricity, etc.). Assessment: during the oral examination, by practical/numerical applications and analysis of case studies. Autonomous evaluation: The student will be able to provide adequate interpretations for development scenarios in the energy sector and markets, properly keeping into account the recent legislative provisions in the energy sector. Also, the student will be able to identify potential interventions for more rational conversions and uses of energy in specific users. Assessment: during the oral examination, by analysing the capability of the student to interpret correctly practical problems based on the theoretical principles learned, while identifying those more suited for the specific examined application. Ability to explain: The student will be able to discuss, with clearness and an appropriate use of language, with engineers or people experienced in the energy field (or with technical/practical skills) about energy planning, regulation and markets, energy conversion processes in small and large scale plants, respectively for civil and industrial energy users. Assessment: during the oral examination, analysis of the capability to express simple and more complex concepts correctly, clearly and with adequate use of the specialistic terminology. Lifelong learning skills The student will have acquired the basic concepts and capabilities needed to conduct deeper and more advanced studies in the energy sector, with reference to the management of regional gas and electricity systems and infrastructures, thermal integration in industry, implementation of energy audits and energy diagnosis of existing systems. Also, the student will be able to further learn, on fields, possible specific solutions to implement the acquired concepts
ASSESSMENT METHODS	The evaluation is based on a final oral examination. The student must meet, during the oral examination, at least three theoretical or applicative questions on all the contents covered by the course, and focused in particular both on aspects related with energy planning or regulation and with specific technologies or solutions to achieve energy saving and increase the efficiency of energy supply in civil or industrial users. The answer to the proposed questions, which may be either open or more specific, are to be formulated according to the approaches proposed in the support material to the course provided by the Professor. The final assessment is aimed at evaluating the student in terms of knowledge and level of understanding of the topics addressed in the course, capability of interpretation and autonomous analysis of applicative case studies. In order to achieve a sufficient evaluation, the student must at least show a general knowledge and understanding of the topics and some basic capabilities to address applicative problems concerning energy saving and rationalization of energy conversion processes; at meantime, the student must show sufficient capabilities in discussing and argumenting the topics, demonstrating the possibility to transfer his knowledge to the examiner. Below this threshold, the examination is considered not sufficient. The duration of the final oral examination is approximately 50 minutes. The evaluation marks are out of thirty. Rating - Votes Excellent 30 - 30 with distinction: excellent knowledge and understanding of the topics, excellent evidence of capability to apply the theoretical and technical knowledge for solving provlems, excellent ability to communicate knowledge in

	terms of clearness, fluency and correct use of language Very good 26-29: very good knowledge and understanding of the topics, evidence of more than adequate capability to apply the theoretical and technical knowledge for solving provlems, very good ability to communicate knowledge with clearness and appropriate use of language Good 24-25: basic knowledge of the main topics, good capability to explain concept with a good use of technical language, reasonable ability to independently apply the knowledge to the solution of the proposed problems Satisfactory 21-23: student does not have full capabilities but has the basic knowledge, more than sufficient control of the technical language, more than sufficient ability to address autonomously practical problems by applying the theroretical knowledge Sufficient 18-20: student has minimal knowledge of topics and minimal capability to use the appropriate language, very little or no ability to independently apply the knowledge Insufficient: student does not have an acceptable knowledge of the topics
EDUCATIONAL OBJECTIVES	An adequate knowledge of methodoligcal and practical aspects related to energy management and the capability to use this knowledge to interpret and address specific problems that can encountered on fields as concerns the efficient and rational use of energy.
TEACHING METHODS	Lessons in class. Some numerical applications will be developed during the lessons (due to the strict relationship with the theoretical concepts explained), and not as separate "practice" activities
SUGGESTED BIBLIOGRAPHY	- Materiale messo a disposizione dal docente, sotto forma di dettagliate dispense sui singoli argomenti del corso. Ulteriori testi per approfondimento: - Nino Di Franco. Energy Management: Fondamenti per la valutazione, la pianificazione ed il controllo dell'efficienza energetica. FrancoAngeli Editore, 2015

SYLLABUS

Hrs	Frontal teaching
3	Energy uses and classification of energy sources. Macro-energetic indicators
8	Data and statistics, at national and global level, on fossil and renewable energy sources - Qualitative aspects of oil and infrastructural aspects of natural gas transportation
5	Energy price on the international market: spot and futures market of oil
6	Economic assessment of alternatives in the energy sector - Ordinary and differential cash flow - Economicperformance indicators (NPV, SPB, DPB, IRR), notes on variable and constant currency analyses and on interest and inflation rates
5	International gas market: third party access to the essential facilities, features of international contracts in the gas sector and barriers to the growth of an efficient international market for gas
3	Energy balances
4	Power plants and cost components in electricity production - National electric loads: aggregated and disaggregated data and features
12	National electric system, infrastructural aspects, energy market
10	White Certificates, brief notes on CIP 6/92 and Green Certificates mechanisms, autoproduction of electricity and "Ritiro Dedicato", incidence of support mechanisms on the bill of private customers
2	Energy forniture and performance contracts
5	Energy auditing of civil and industrial users - Load profiles and duration curves
12	Technologies for the production of hot/warm and cold fluids: energetic comparison between alternatives, energy efficiency indicators, design criteria and optimal operation for a rational use of energy
6	Combined production of heat, cooling and electricity