UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	ENERGY ENGINEERING AND RENEWABLE ENERGIES
SUBJECT	ELECTRIC POWER DISTRIBUTION
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50298-Ingegneria elettrica
CODE	20460
SCIENTIFIC SECTOR(S)	ING-IND/33
HEAD PROFESSOR(S)	IPPOLITO MARIANO GIUSEPPE Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**IPPOLITO MARIANO GIUSEPPE** Tuesday 08:00 10:00 DEIM, Edificio n.9, II piano, viale delle Scienze, Palermo Wednesday 12:00 13:00 DEIM, Edificio n.9, II piano, viale delle Scienze, Palermo Friday 09:00 10:00 DEIM, Edificio n.9, II piano, viale delle Scienze, Palermo

DOCENTE: Prof. MARIANO GIUSEPPE IPPOLITO

PREREQUISITES	Basic concepts on calculus, physics and electrical components.
LEARNING OUTCOMES	Knowledge and understanding The student at the end of the course will have acquired knowledge and understanding regarding the electrical distribution systems, with particular reference to the design aspects and to the verification criterions. The verification of these objectives is expected within the final oral exam. Applying knowledge and understanding The student at the end of the course will be able to apply his knowledge and understanding to identify, formulate and solve problems related to electrical design, in particular, the student will be able to choose the most suitable solutions to identify the measures and size the various electrical components. The verification of these objectives is expected within the written and oral examination. Making judgments The student at the end of the course will have acquired the ability to gather and interpret all the data necessary for the identification and analysis of the main issues related to the design of an electrical installation. To achieve these objectives, the course will include lectures, discussion of case studies, classroom and auonomous exercises. The verification of these objectives is expected within the written and oral examination. Communication skills The student at the end of the course will have acquired the ability to communicate with competently, consistencly and using a correct language on the various issues and problems concerning the design of an electrical plant. The verification of these objectives is expected within the final oral examination. Learning ability The student at the end of the course will have acquired knowledge and skills not only on issues related to the problems of the design of an electrical installation, but also about on the need to work always and in any case a continuous selfstudy, because of the constant changes in regulations and legislation and the technical and technological progress. He will be able, therefore, to continue his engineering studies with greater autonomy, awareness and discernment, recognizing that independent learning will characterize throughout his professional life. The verification of these objectives is expected within the final oral examination.
ASSESSMENT METHODS	Two exams: a first written test lasting two hours consisting in theoretical and numerical questions. This text will been evaluated on the basis of thirtieths. Students who get a vote in the writing test not lower than eighteen/thirtieths will be admitted to the oral exam. The oral exam will consist of an interview, in order to check that the student possess the skills and disciplinary knowledge in all of the main topics described in the program. The oral questions could have also an open nature and hence the answers could be discursive. The final assessment will be formulated taking into account both the written exam and the interview. The final assessment is on a 30 basis according to the following criteria: - 28-30/30 e lode The student demonstrates a very good / excellent knowledge and understanding of the course contents, which declines in absence of errors and with selfcorrection of some inaccuracies; the answers to the questions posed are organized with a rigorous approach by providing complete solutions and demonstrating good / excellent application capabilities with a high degree of autonomy. The ability to communicate is characterized by very good / excellent clearness, fluency and use of language and articulated arguments which show a full ability to rielaborate and make judgments both in the same discipline and in interdisciplinary fields. - 24-27 The student demonstrates a satisfactory / good knowledge and understanding of the course contents, which declines with few minor errors or omissions partially corrected or integrated by means the professor guide; the answers to the questions posed are basically correct, showing a satisfactory / good ability of independent analysis. The ability to communicate is characterized by a satisfactory / good consistency in connecting the concepts both in the same discipline and in interdisciplinary fields; adequate clearness and substantially correct use of language. - 18-23 The student demonstrates a sufficient/decent knowledge and understanding of discipline contents, which declines with no several and critical errors and/or omissions; the answers, even if adequate, are characterize by a limited level of autonomy and effectiveness. The ability to communicate is of acceptable level of clearness, fluency and use of language, but with some limitations of concepts reinterpretation and connection in disciplinary context. - below 18 The student shows to have not reached the minimum level of learning

	outcomes. Insufficient knowledge, with many several and siginificant errors or inaccuracies; insufficient capacity in the analysis and resolution of the problems, lack of autonomy in the methodological approach, inability to orient in an autonomous way or to conduct disciplinary and interdisciplinary links; deficient presentation skills and argumentation, unclear and inadequate use of language.
EDUCATIONAL OBJECTIVES	The course aims to give students the basic knowledge on electrical distribution systems, with particular reference to the design aspects and to the verification criterions. A further objective is to give awareness about the need to operate a continuous study during the whole of future activities professional, because of the constant changes of the regulation and technical context, in order to identify the better solutions to secure the proper operation of electrical systems.
TEACHING METHODS	Lectures, exercises, case studies development, analysis and classroom discussion. Teaching activities are organized to help the achievement learning outcomes (see learning outcomes section, descriptors D.1-D.5). The course contents are offered through lectures and guided exercises, emphasizing the applications and the synergy between the different topics (D.1). During the course, the contents are applied to problem solving issues and works on case studies, thus stimulating the development of the ability to apply the acquired knowledge and skills (D.2). During lectures (partly carried out through dialogues and interactions with students), exercises and activities related to projects/case studies, students are fostered to critically analyze the proposed issues; this helps the development of students analytical abilities and autonomous judgment (D.3). At the same time, the dialogue and interaction opportunities foster students to improve their skills of communication, argumentation and use of language (D.4). Finally, all course activities contribute to the development of learning skills, through knowledge reworking, links to real and interdisciplinary applications and stimulus in facing new problems autonomously (D.5).
SUGGESTED BIBLIOGRAPHY	- V. Cataliotti: “Impianti elettrici” Volumi 1° e 3°– Dario Flaccovio Editore, Palermo. - Luces M. Faulkenberry, W. Coffer "Electrical Power Distribution and Transmission" - Prentice Hall, New Jersey (per consultazione) - Materiale didattico fornito dal docente su specifici argomenti

SYLLABUS

Hrs	Frontal teaching
3	Introduction. Objectives of the course. Main considerations on electrical power system. Layout of transmission and distribution systems. Main classifications. Technical rules.
11	Determination of size of conductor for a distribution system. Voltage drop calculation. Thermal issues. Losses calculation. Technical and economic choices.
7	Classification of faults. Causes and effects of short-circuit currents. Calculation of short-circuit currents for symmetrical and unsymmetrical faults.
9	Protection systems against over-currents. Distribution equipment. Protective relay, fuses and circuit breakers. Selectivity issues.
3	Power factor correction. Basic concepts and effects. Compensation methods for plants and distribution networks.
2	System neutral earthing.
2	Distribution substations.

Hrs	Practice
17	Exercises and analysis of case studies on: - calculation of distribution networks - calculation of short-circuit currents - power factor correction.