



# UNIVERSITÀ DEGLI STUDI DI PALERMO

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| DEPARTMENT                   | Ingegneria   |
| ACADEMIC YEAR                | 2018/2019  |
| BACHELOR'S DEGREE (BSC)      | SAFETY ENGINEERING   |
| SUBJECT                      | ELECTRICAL DEVICES AND CIRCUITS  |
| TYPE OF EDUCATIONAL ACTIVITY | B  |
| AMBIT                        | 50298-Ingegneria elettrica   |
| CODE                         | 02965  |
| SCIENTIFIC SECTOR(S)         | ING-IND/31   |
| HEAD PROFESSOR(S)            | ALA GUIDO                      Professore Ordinario                      Univ. di PALERMO  |
| OTHER PROFESSOR(S)           |  |
| CREDITS                      | 6  |
| INDIVIDUAL STUDY (Hrs)       | 96   |
| COURSE ACTIVITY (Hrs)        | 54   |
| PROPAEDEUTICAL SUBJECTS      |  |
| MUTUALIZATION                | ELECTRICAL DEVICES AND CIRCUITS - Corso: COMPUTER ENGINEERING<br>ELECTRICAL DEVICES AND CIRCUITS - Corso: INGEGNERIA INFORMATICA |
| YEAR                         | 2  |
| TERM (SEMESTER)              | 1° semester  |
| ATTENDANCE                   | Not mandatory  |
| EVALUATION                   | Out of 30  |
| TEACHER OFFICE HOURS         | <b>ALA GUIDO</b><br>Monday    10:00    11:00    ufficio 2022, edificio 9, viale delle Scienze, Palermo                           |

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| <b>PREREQUISITES</b>      | Sufficient knowledge of the basic concepts and methods of mathematical analysis and geometry. Sufficient knowledge of the basic concepts of physics (electric and magnetic phenomena).   |
| <b>LEARNING OUTCOMES</b>  | <p>Knowledge and understanding</p> <p>At the end of the course, the students will have acquired knowledge and understanding capacity on:</p> <ul style="list-style-type: none"><li>• methods of analysis of linear electrical network; steady-state and steady-state sinusoidal behaviour;</li><li>• three-phase systems.</li></ul> <p>Verification of this objective is made during the written test and the interview.</p> <p>Applying knowledge and understanding</p> <p>The student, at the end of the course, will be able to:</p> <ul style="list-style-type: none"><li>• discern, in the context of linear electrical networks, different physical phenomena, identifying cause-and-effect relationships, identifying, formulating and analyzing these phenomena by means of methods, techniques and instruments up to date;</li><li>• apply the main theorems of linear electrical networks;</li><li>• set the time domain analysis of linear electrical networks;</li><li>• set the symmetrical, balanced and unbalanced three-phase systems analysis;</li></ul> <p>Verification of this objective is made during the written test and the interview.</p> <p>Making judgements</p> <p>The student will have acquired the necessary autonomy to be able to assess critically circuit analysis based on what reported before. Verification of this objective is made during the written test and the interview.</p> <p>Communications skills</p> <p>The student will have acquired the ability to communicate, using appropriate technical language, the fundamental aspects related to the analysis of linear circuits based on what reported before at any scheme, proposing standard solutions in specialized contexts. The acquisition of communication skills will be verified through the final interview.</p> <p>Learning skills</p> <p>The student will be able to study electrical systems in civil and small industrial applications.</p> <p>The student will be able to address more advanced topics, through the use of bibliographic resources and with growing independence.</p> <p>The learning skills will be tested during the final test in which the student will give evidence of awareness achieved, critical capacity of analysis and synthesis of theoretical and practical aspects of the course.</p> |
| <b>ASSESSMENT METHODS</b> | <p>The assessment is carried out through a written test and a subsequent interview.</p> <p>Both the written test and the interview are supported by the student at the end of the cycle of lectures and tutorials, in one of the exam session provided in the academic calendar of the Polytechnic School.</p> <p>The written test, lasting no more than an hour, consists of one or more exercises: they can be solved by using the acquired skills. During the written test it is allowed the use of only drawing and writing tools as well as the Pocket Calculator. The written test can be faced in any call of the exam session: the written test can be repeated in any appeal of the same exam session. The student accesses the interview only if he passes the written test. The interview is held in one of the days immediately following the written test, with reference to the active call. If the written test is passed, the student can face the interview in any call of the active exam session.</p> <p>The written test is evaluated by a judgement declined as follows: fail, just sufficient, sufficient, moderate, good, very good. The evaluation criteria are described below.</p> <p>Rating: 29-30 (excellent knowledge and ability to understand the topics, great capacity for analysis and synthesis, the student possesses excellent ability to apply the acquired knowledge to solve the proposed problems).</p> <p>Rating: 27-28 (good knowledge and ability to understand the topics, good capacity for analysis and synthesis, the student has good ability to apply the acquired knowledge to solve the proposed problems).</p>  |

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|                               | <p>Rating: 24-26 (moderate knowledge and ability to understand the arguments, discrete capacity for analysis and synthesis, the student possesses moderate ability to apply the acquired knowledge to solve the proposed problems).</p> <p>Judgment: 20-23 (sufficient knowledge and ability to understand the arguments, sufficient capacity for analysis and synthesis, the student has sufficient ability to apply the acquired knowledge to solve the proposed problems).</p> <p>Judgment: 18-19 (minimum knowledge and capacity for understanding of the topics, minimal capacity for analysis and synthesis, the student possesses minimal ability to apply the acquired knowledge to solve problems).</p> <p>Judgment: fail (insufficient knowledge and ability to understand the arguments, insufficient capacity for analysis and synthesis, the student has not acquired the ability to apply the knowledge to solve the proposed problems).</p> <p>During the interview the student is involved in the discussion of the written test and in the response/discussion to two open questions. It is intended to complete the assessment of the achievement of the expected results.<br/>At the end of the interview a 30-point scale rating is proposed: this rating represents the synthesis of overall judgment on the written test and the interview itself.<br/>The evaluation criteria are described below.</p> <p>Rating: 30 with distinction (Learning outcomes have been achieved to an excellent level. The student possesses excellent knowledge and ability to understand the topics, great ability to apply the acquired knowledge, he demonstrates full autonomy of judgment, he is fully aware and he has full capacity analysis and synthesis of critical methodological aspects and applications of the course; he has full ability to communicate knowledge, analyses and conclusions, with an excellent level of clearness, fluency and correct use of language; he also shows full evidence for autonomously undertaking further studies).</p> <p>Rating: 28-30 (Learning outcomes have been achieved to a good level. The student possesses good knowledge and ability to understand the topics, good ability to apply the acquired knowledge, he demonstrates good autonomy of judgement, he has good awareness and good critical analysis and synthesis capabilities of methodological aspects and applications of the course; he has good ability to communicate knowledge, analyses and conclusions, with a good level of clearness, fluency and correct use of language; he also shows good evidence for autonomously undertaking further studies).</p> <p>Rating: 25-27 (Learning outcomes have been achieved to a moderate level. The student possesses moderate knowledge and ability to understand the topics, moderate ability to apply the acquired knowledge, he demonstrates moderate autonomy of judgement, he has discrete awareness and moderate critical analysis and synthesis capabilities of methodological aspects and applications of the course; he has moderate ability to communicate knowledge, analyses and conclusions, with a moderate level of clearness, fluency and correct use of language; he also shows moderate evidence for autonomously undertaking further studies).</p> <p>Rating: 21-24 (Learning outcomes have been achieved to a satisfactory level. The student possesses satisfactory knowledge and ability to understand the topics, satisfactory ability to apply the acquired knowledge, he demonstrates a satisfactory autonomy of judgement, he has satisfactory awareness and satisfactory critical analysis and synthesis capabilities of methodological aspects and applications of the course; he has satisfactory ability to communicate knowledge, analyses and conclusions, with a satisfactory level of clearness, fluency and correct use of language; he also shows a satisfactory evidence for autonomously undertaking further studies).</p> <p>Rating: 18-20 (the student possesses sufficient knowledge and ability to understand the arguments, a sufficient ability to apply the knowledge acquired, is expressed with sufficient property of language and demonstrates sufficient autonomy of judgement, has sufficient knowledge and sufficient critical capacity for analysis and synthesis of methodological aspects and applications of course; he also shows sufficient evidence for autonomously undertaking further studies).</p> |
| <b>EDUCATIONAL OBJECTIVES</b> | Development of professional knowledge and insight in the field of electrical circuit applied to small industrial power installations. Ability to solve linear circuits and to make performance evaluation of electrical systems.   |
| <b>TEACHING METHODS</b>       | The teaching activities are organized as follows. Lectures and exercises, these last both theoretical and by using a free simulation software, conducted in the classroom by the teacher; classwork carried out by students under the guidance   |

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|                               | of the teacher; classwork carried out independently by students, both individually and in groups: in this case the teacher interacts directly with the individual student by supporting the elaboration of knowledge and its application, learning skills and independence of judgement; interaction and continuous dialogue between teacher and students during the lectures, through questions posed so impromptu and aimed at stimulating attention, communication skills, property of language, the autonomy of judgement.  |
| <b>SUGGESTED BIBLIOGRAPHY</b> | <ul style="list-style-type: none"> <li>•R Perfetti: "Circuiti elettrici" - Zanichelli, 2012</li> <li>•Esercitazioni proposte dal docente, disponibili sul portale studenti unipa.</li> <li>•M. D'Amore: "Elementi di Elettrotecnica - Campi e circuiti" - Edizioni Scientifiche Siderea, 1995.</li> <li>•Liberatore, S. Manetti, M.C. Piccirilli, A. Reatti: "Circuiti elettrici ed elettronici - Esercizi commentati e risolti" – Progetto Leonardo, Bologna, 2003.</li> <li>•Bagatin, Chitarin, Desideri, Dughiero, Gnesotto, Guarnieri, Maschio: Esercizi di Elettrotecnica - reti elettriche - Societa' Ed. Esculapio, 2013.</li> </ul> |

## SYLLABUS

| <b>Hrs</b> | <b>Frontal teaching</b>   |
|------------|---|
| 20         | Principles, theorems and methods for the analysis of linear circuits (DC circuits, steady-state sinusoidal circuits). |
| 10         | Three-phase systems: properties and general methods of analysis.  |
| <b>Hrs</b> | <b>Practice</b>   |
| 18         | Time domain analysis of electrical linear circuits. Steady-state sinusoidal analysis of electrical linear circuits.   |
| 6          | Three-phase systems analysis.   |