| Teaching Guide | | | | |
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| Identifying Data | | | | 2023/24 |
| Subject (*) | Analogue Electronics | | Code | 631G03031 |
| Study programme | Grao en Máquinas Navais | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 1st four-month period | Third | Optional | 6 |
| Language | Spanish | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Enxeñaría de Computadores | | | |
| Coordinador | Bregains Rodriguez, Julio Claudio | E-mail | julio.bregains@udc.es | |
| Lecturers | Bregains Rodriguez, Julio Claudio | E-mail | julio.bregains@udc.es | |
| Web | campusvirtual.udc.es | | | |
| General description | In this course the student will acquire the basic knowledge of components and circuits that make up the systems based on analog electronics in the ship. The course will study the start-up, operation, detection and resolution of possible failures of: control systems, amplifiers and basic communications systems. | | | |

| Study programme competences | |
|---|---|
| Code | Study programme competences |
| A11 | CE11 - Manter e reparar o equipo eléctrico e electrónico. |
| A18 | CE18 - Supervisar o funcionamento dos sistemas eléctricos, electrónicos e de control. |
| A20 | CE20 - Facer funcionar os xeradores e os sistemas de distribución. |
| A23 | CE23 - Manter e reparar os sistemas de control automático da maquina propulsora principal e das maquinas auxiliares. |
| A24 | CE24 - Manter e reparar o equipo náutico da ponte e os sistemas de comunicación do buque. |
| A25 | CE25 - Manter e reparar os sistemas eléctricos, electrónicos e de control da maquinaria de cuberta e do equipo de manipulación da carga. |
| A26 | CE26 - Manter e reparar os sistemas de control e seguridade do equipo de fonda. |
| A81 | CE81 - Coñecer o funcionamento e operación dos equipos e sistemas auxiliares instalados en buques e instalacións marítimas. |
| A91 | CE91 - Redactar e interpretar documentación técnica. |
| A100 | CE100 - Ter a capacidade para exercer como oficial ETO da Mariña Mercante, unha vez superados os requisitos esixidos pola Administración Marítima. |
| B2 | CB2 - Aplicar os coñecementos no seu traballo ou vocación dunha forma profesional e posuír competencias demostrables por medio da elaboración e defensa de argumentos e resolución de problemas dentro da área dos seus estudos |
| B3 | CB3 - Ter a capacidade de reunir e interpretar datos relevantes para emitir xuicios que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética |
| B4 | CB4 - Poder transmitir información, ideas, problemas e solucións a un público tanto especializado como non especializado. |
| B5 | CB5 - Ter desenvolvido aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores con un alto grao de autonomía. |
| B6 | CG01 - Capacidade para xestionar os propios coñecementos e utilizar de forma eficiente técnicas de traballo intelectual. |
| B7 | CG02 - Resolver problemas de forma efectiva. |
| B8 | CG03 - Comunicarse de maneira efectiva nunha contorna de traballo. |
| B9 | CG04 - Traballar de forma autónoma con iniciativa. |
| B10 | CG05 - Traballar de forma colaborativa. |
| B11 | CG06 - Comportarse con ética e responsabilidade social como cidadán e como profesional. |
| B14 | CG09 - Comunicar por escrito e oralmente os coñecementos procedentes da linguaxe científica. |
| B15 | CG10 - Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razoamento crítico e de comunicar e transmitir coñecementos habilidades e destrezas. |
| B16 | CG11 - Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse. |

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| B17 | CG12 - Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida. |
| C1 | CT01 - Expresarse correctamente, tanto de forma oral como escrita, nas linguas oficiais da comunidade autónoma. |
| C3 | CT03 - Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida. |
| C7 | CT07 - Desenvolver a capacidade de traballar en equipos interdisciplinares ou transdisciplinares, para ofrecer propostas que contribúan a un desenvolvemento sostible ambiental, económico, político e social. |
| C8 | CT08 - Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade. |
| C9 | CT09 - Ter a capacidade de xestionar tempos e recursos: desenvolver plans, priorizar actividades, identificar as críticas, establecer prazos e cumprilos. |

| Learning outcomes | | | |
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| Learning outcomes | Study programme competences | | |
| A11 CE11 - Maintain and repair electrical and electronic equipment. | A11 | | |
| A18 CE18 - Supervise the operation of electrical, electronic and control systems. | A18 | | |
| A20 CE20 - Operate generators and distribution systems. | A20 | | |
| A23 CE23 - Maintain and repair the automatic control systems of the main propulsion machine and auxiliary machines. | A23 | | |
| A24 CE24 - Maintain and repair the ship's bridge nautical equipment and communication systems. | A24 | | |
| A25 CE25 - Maintain and repair electrical, electronic and control systems of deck machinery and cargo handling equipment. | A25 | | |
| A26 CE26 - Maintain and repair the control and safety systems of the catering equipment. | A26 | | |
| A81 CE81 - To know the functioning and operation of auxiliary equipment and systems installed on ships and maritime installations. | A81 | | |
| A91 CE91 - Write and interpret technical documentation. | A91 | | |
| A100 CE100 - To have the capacity to work as an ETO officer of the Merchant Navy, once the requirements demanded by the Maritime Administration have been met. | A100 | | |
| B2 CB2 - That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study. | | B2 | |
| B3 CB3 - Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues. | | B3 | |
| B4 CB4 - Students can convey information, ideas, problems and solutions to both specialized and non-specialized audiences. | | B4 | |
| B5 CB5 - That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy. | | B5 | |
| B6 CG01 - Ability to manage one's own knowledge and efficiently use intellectual work techniques. | | B6 | |
| B7 CG02 - Solve problems effectively | | B7 | |
| B8 CG03 - Communicate effectively in a work environment. | | B8 | |
| B9 CG04 - Work autonomously with initiative. | | B9 | |
| B10 CG05 - Work collaboratively. | | B10 | |
| B11 CG06 - Behave ethically and with social responsibility as a citizen and as a professional. | | B11 | |
| B14 CG09 - Communicate in writing and orally the knowledge coming from scientific language. | | B14 | |
| B15 CG10 - Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities. | | B15 | |
| B16 CG11 - Critically appraise the knowledge, technology and information available to solve the problems they must face. | | B16 | |
| B17 CG12 - Assume as a professional and citizen the importance of lifelong learning. | | B17 | |
| C1 CT01 - Express oneself correctly, both orally and in writing, in the official languages of the autonomous community. | | | C1 |
| C3 CT03 - Use the basic tools of information and communication technologies (ICT) necessary for the exercise of their profession and for lifelong learning. | | | C3 |
| C7 CT07 - Develop the ability to work in interdisciplinary or transdisciplinary teams to offer proposals that contribute to sustainable environmental, economic, political and social development. | | | C7 |

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| C8 CT08 - Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society. | | | C8 |
| C9 CT09 - Have the ability to manage time and resources: develop plans, prioritize activities, identify critical ones, set deadlines and meet them. | | | C9 |

| Contents | |
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| Topic | Sub-topic |
| 1. Fundamentals. | 1.1. Physical principles.<br>1.2. Electronic devices.<br>1.2.1. Diodes.<br>1.2.2. Bipolar transistors.<br>1.2.3. Unipolar transistors.<br>1.2.4. Integrated circuits. |
| 2. Control systems. | 2.1. Fundamentals and basic systems.<br>2.1.1. Analysis and design.<br>2.1.2. Start-up and operation.<br>2.1.3. Maintenance and troubleshooting.<br>2.1.4. Control systems on ship and in port. |
| 3. Amplifiers. | 3.1. Fundamentals and basic systems.<br>3.1.1. Analysis and design.<br>3.1.2. Start-up and operation.<br>3.1.3. Maintenance and troubleshooting.<br>3.1.4. Amplifiers on ship and in port. |
| 4. Communication systems. | 4.1. Fundamentals and basic systems.<br>4.1.1. Analysis and design.<br>4.1.2. Start-up and operation.<br>4.1.3. Maintenance and troubleshooting.<br>4.1.4.. Communication systems on ship and in port. |

| Planning | | | | |
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| Methodologies / tests | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A81 B3 B5 B11 B16 B17 | 30 | 40 | 70 |
| Problem solving | B2 B6 B7 B9 B15 | 7 | 28 | 35 |
| Laboratory practice | A11 A18 A20 A23 A24 A25 A26 A91 A100 B4 B8 B10 B14 C1 C7 C8 C9 | 7 | 14 | 21 |
| ICT practicals | A18 A24 A25 A26 A81 A91 A100 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B14 B15 B16 B17 C1 C3 C7 C8 C9 | 7 | 14 | 21 |
| Mixed objective/subjective test | A81 A91 A100 B2 B3 B4 B5 B6 B7 B9 B11 B14 B15 B16 B17 C1 C3 C8 C9 | 3 | 0 | 3 |
| Personalized attention | | 0 | | 0 |

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

| Methodologies | |
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| **Methodologies** | **Description** |
| Guest lecture / keynote speech | Didactic exposition -using slides and/or blackboard- of the theoretical contents of the subject. |
| Problem solving | Presentation and resolution of problems related to the contents of the subject, using slides and/or blackboard. |
| Laboratory practice | The students will solve a series of practices in the Electronics Laboratory, on measurement equipment and use of components. Along with these practices, they will also have to answer questions related to the topics to be developed in them. |
| ICT practicals | The students will solve a series of practical exercises on PC, using electronic circuit simulation software. Along with these practices, they will also have to answer questions related to the topics to be developed in them. |
| Mixed objective/subjective test | Theory test and problem solving on the contents exposed during the lectures and problem solving sessions of the whole course. |

| Personalized attention | |
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| **Methodologies** | **Description** |
| ICT practicals<br>Laboratory practice<br>Guest lecture / keynote speech<br>Problem solving | Lecture session: To attend and solve inquiries of the students in relation to the theoretical contents exposed in the lecture sessions.<br><br>Laboratory practices: To attend and solve inquiries of the students in relation to the proposed or carried out practices.<br><br>Practices through ICT: Attend and solve inquiries of the students in relation to the practices proposed or carried out through ICT.<br><br>Problem solving: Attending and solving student's inquiries related to the problems solved in class.<br><br>Personalized attention: In cases of individualized attention will be used preferably face-to-face tutoring sessions, or through Teams. |

| Assessment | | | |
|---|---|---|---|
| **Methodologies** | **Competencies** | **Description** | **Qualification** |
| ICT practicals | A18 A24 A25 A26 A81 A91 A100 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B14 B15 B16 B17 C1 C3 C7 C8 C9 | The work done by the student in each of the sessions will be assessed. Part-time students or students with academic dispensation for exemption from teaching will have the option of taking an ICT practice exam at the end of the course. | 10 |
| Mixed objective/subjective test | A81 A91 A100 B2 B3 B4 B5 B6 B7 B9 B11 B14 B15 B16 B17 C1 C3 C8 C9 | It will consist of two parts of theoretical examination and problem solving on the contents exposed throughout the course during the lectures, assessing the understanding of such contents and their application to problem solving. | 60 |
| Laboratory practice | A11 A18 A20 A23 A24 A25 A26 A91 A100 B4 B8 B10 B14 C1 C7 C8 C9 | The work done by the student in each of the sessions will be assessed. Part-time students or students with academic dispensation of exemption from teaching will have the option of taking a laboratory practice exam at the end of the course. | 10 |
| Problem solving | B2 B6 B7 B9 B15 | It will consist of the evaluation of problem solving through a set of tests. | 20 |

| Assessment comments |
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The mixed test and the problem-solving tests constitute 80% of the grade. The evaluation of the laboratory practices and through ICT, together with the short answer test, constitute the remaining 20%.
Description of the evaluation and distribution of points.
FIRST OPPORTUNITYA) MIXED TEST:
It will consist of two midterm exams of 6 points (maximum) each. In order to pass the course, a minimum of 3 points must be obtained in each one. Once obtained, the grade of the mixed exam will be the average of the grades of both midterm exams.If any of the midterm exams are not passed, the student will have the opportunity to pass them in the final exam (1st opportunity).B) PROBLEM SOLVING:
It will consist of a set of tests with a maximum combined score of 2 points, with a minimum of 1 to pass the course. If the tests are not passed, the student will have a problem-solving exam on the same date and time as the final exam (see section A). This exam must be passed in order to pass the course.C) LABORATORY/TIC PRACTICES:
It will consist of a set of tests of questions about concepts, together with laboratory and computer simulation (ICT) tasks with a maximum combined evaluation of 2 points, with a minimum of 1 to pass the course.If the assignments are not passed, the student will have a laboratory exam at the date and time established by the center. This exam must be passed in order to pass the course. FINAL GRADE: If all three parts (A, B and C) are passed, the final grade will be the sum of them. In case of failing, the final grade will be one half of such a sum.Academic fraud in the performance of tests or evaluation activities: The fraudulent performance of the evaluation tests or activities, once verified, will directly imply the qualification of failure in the call in which it is committed: the student will be qualified with "suspenso" (numerical grade 0) in the corresponding call of the academic year, whether the commission of the fault occurs in the first opportunity or in the second. For this, the student's grade will be modified in the first opportunity report, if necessary.SECOND OPPORTUNITYThe grade obtained in the laboratory practices and problem solving will be maintained. The grades of the mid-term exams of the first opportunity will not be maintained. As in the case of the first opportunity, the mixed exam will consist of two midterm exams of 6 points (maximum) each. In order to pass the course, a minimum of 3 points must be obtained in each one. Once obtained, the grade of the mixed exam will be the average of the grades of both midterm exams. In case of not having passed the practices or problem solving, the student will have at his/her disposal the corresponding exams (similar and with the same conditions as those of the first opportunity).
Students enrolled part-time or who have been granted the academic waiver of exemption from attendance, as established in the "Norma que regula o réxime de dedicación ao estudo dos estudantes de grao na UDC" (Arts. 2.3; 3.b; 4.3 e 7.5) (04/05/2017), will take the same evaluation tests as students enrolled full-time.
He/she will have the option to take a lab/ICT practicum exam at each opportunity.

The evaluation criteria contemplated in Table A-III/6 of the STCW Code, and included in the Quality Assurance System, will be taken into account when designing and carrying out the evaluation.

| Sources of information | |
|---|---|
| Basic | - Brégains, J. (). Material de la asignatura en moodle. Moodle (campusvirtual.udc.es)<br>- Bandera Rubio, A. J. (2010). Fundamentos de electrónica analógica. Universidad de Málaga<br>- Bolton, W. (2013). Mecatrónica. Alfaomega<br>- Franco, S. (2005). Diseño con amplificadores operacionales y circuitos integrados analógicos. McGraw-Hill Interamericana<br>- Beasley, J. S. (2014). Electronic communication: a systems approach. Pearson<br>- Gray, P. (2009). Analysis and design of analog integrated circuits. John Wiley & Sons |
| Complementary | |

| Recommendations |
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| Subjects that it is recommended to have taken before |
| Electronics and Control Systems/631G03016<br>Mathematics I/631G03001<br>Mathematics II/631G03006<br>Physics I/631G03003<br>Physics II/631G03008 |
| Subjects that are recommended to be taken simultaneously |
| Automatisms and Control Systems/631G03038<br>Power Electronics/631G03035 |
| Subjects that continue the syllabus |
| Electronic Communication Systems and Navigation Aids/631G03050<br>Networks and Communications/631G03052 |
| Other comments |
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**(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.**