



## Teaching Guide

| Teaching Guide      |                                                                                               |        |                                                  |           |
|---------------------|-----------------------------------------------------------------------------------------------|--------|--------------------------------------------------|-----------|
| Identifying Data    |                                                                                               |        |                                                  | 2022/23   |
| Subject (*)         | Electronic Communication Systems and Navigation Aids                                          |        | Code                                             | 631G02457 |
| Study programme     | Grao en Tecnoloxías Mariñas                                                                   |        |                                                  |           |
| Descriptors         |                                                                                               |        |                                                  |           |
| Cycle               | Period                                                                                        | Year   | Type                                             | Credits   |
| Graduate            | 1st four-month period                                                                         | Fourth | Optional                                         | 6         |
| Language            | SpanishGalicianEnglish                                                                        |        |                                                  |           |
| Teaching method     | Face-to-face                                                                                  |        |                                                  |           |
| Prerequisites       |                                                                                               |        |                                                  |           |
| Department          | Ciencias da Navegación e Enxeñaría MariñaEnxeñaría de Computadores                            |        |                                                  |           |
| Coordinador         | López López, María Natividad                                                                  | E-mail | natividad.lopezl@udc.es                          |           |
| Lecturers           | Iglesia Iglesias, Daniel Ismael<br>López López, María Natividad                               | E-mail | daniel.iglesia@udc.es<br>natividad.lopezl@udc.es |           |
| Web                 |                                                                                               |        |                                                  |           |
| General description | Assemble, cook and perform basic maintenance tasks of communication and navigation equipment. |        |                                                  |           |

## Study programme competences

| Code | Study programme competences                                                                                                                                                                                                                                                    |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1   | CE1 - Capacidade para a realización de inspeccións, medicións, valoracións, taxacións, peritacións, estudos, informes, planos de labores e certificacións nas instalacións do ámbito da súa especialidade.                                                                     |
| A16  | CE16 - Ensambalar e realizar tarefas básicas de mantemento e reparación de equipos informáticos. Instalar e manexar sistemas operativos e aplicacións informáticas. Instalar e realizar as tarefas básicas de xestión de redes de ordenadores, no ámbito da súa especialidade. |
| A62  | CE52 - Exercer como oficial ETO da Mariña Mercante, logo de superados os requirimentos esixidos pola Administración Marítima                                                                                                                                                   |
| A63  | CE53 - Supervisar o funcionamento dos sistemas eléctricos, electrónicos e de control                                                                                                                                                                                           |
| A67  | CE57 - Facer funcionar os ordenadores e redes informáticas a bordo dos buques                                                                                                                                                                                                  |
| A70  | CE60 - Manter e reparar os equipos de navegación da ponte e dos sistemas de comunicación do buque                                                                                                                                                                              |
| B2   | CT2 - Resolver problemas de forma efectiva.                                                                                                                                                                                                                                    |
| B4   | CT4 - Traballar de forma autónoma con iniciativa.                                                                                                                                                                                                                              |
| B8   | CT8 - Versatilidade.                                                                                                                                                                                                                                                           |
| B9   | CT9 - Capacidade para a aprendizaxe de novos métodos e teorías, que lle doten dunha gran versatilidade para adaptarse a novas situacións.                                                                                                                                      |
| C3   | C3 - 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.                                                                                           |
| C9   | CB1 - Demostrar que posúen e comprenden coñecementos na área de estudo que parte da base da educación secundaria xeneral, e que inclúe coñecementos procedentes da vangardia do seu campo de estudo                                                                            |
| C10  | CB2 - Aplicar os coñecementos no seu traballo ou vocación dunha forma profesional e poseer competencias demostrables por medio da elaboración e defensa de argumentos e resolución de problemas dentro da área dos seus estudos                                                |
| C11  | CB3 - Ter a capacidade de reunir e interpretar datos relevantes para emitir xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética                                                                                                     |
| C12  | CB4 - Poder transmitir información, ideas, problemas e solucións a un público tanto especializado como non especializado.                                                                                                                                                      |
| C13  | CB5 - Ter desenvolvido aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores con un alto grao de autonomía.                                                                                                                                         |

## Learning outcomes

| Learning outcomes | Study programme competences |
|-------------------|-----------------------------|
|-------------------|-----------------------------|



|                                                                                                                   |     |    |     |
|-------------------------------------------------------------------------------------------------------------------|-----|----|-----|
| To know how one operates with the main navigation equipment.                                                      | A1  | B2 | C3  |
| To know how one operates with the main communications equipment in the Bridge.                                    | A16 | B4 | C9  |
| To know how to process the excellent data of a system of communications.                                          | A62 | B8 | C10 |
| To know the techniques transmission and marine systems of aid.                                                    | A63 | B9 | C11 |
| To meet the types more habitual channels in the marine scope.                                                     | A67 |    | C12 |
| To know how to interpret a scheme of blocks of systems radio.                                                     | A70 |    | C13 |
| Optimization of the facilities of a system of communications and radio aid to navigation.                         |     |    |     |
| To handle the common naval telematics systems.                                                                    |     |    |     |
| To diagnose, to detect and to repair to the failures of communication and the navigation equipment of the bridge. |     |    |     |
| To supervise the operation of the electrical, electronic systems and of control.                                  | A1  | B2 | C3  |
| To make work the computers and the computer science networks on board the ships.                                  | A16 | B4 | C9  |
|                                                                                                                   | A62 | B8 | C10 |
|                                                                                                                   | A63 | B9 | C11 |
|                                                                                                                   | A67 |    | C12 |
|                                                                                                                   | A70 |    | C13 |

| Contents                                                                              |                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                                                                                 | Sub-topic                                                                                                                                                                                                                                                                        |
| SECTION I:Subject 1: Systems of radio communications                                  | <ul style="list-style-type: none"> <li>. Majorities: Radioelectric phantom, radio waveses.</li> <li>. Techniques of modulation.</li> <li>. Ways of transmission. Model of receiving transmitter.</li> <li>. Energy sources.</li> </ul>                                           |
| SECTION I:Subject 2: Systems of Marine radio communications.                          | <ul style="list-style-type: none"> <li>. Introduction to the systems of Socorro, urgency and security (functional point of view)</li> <li>. Systems nonGMDSS, systems GMDSS.</li> <li>. DSC.</li> <li>. Radiotelex.</li> <li>. NAVTEX.</li> <li>. Satellite systems</li> </ul>   |
| SECTION I:Subject 3: Systems of Aid to Navigation                                     | <ul style="list-style-type: none"> <li>. Radar, ARPA.</li> <li>. Radiobalizas and Trasponders.</li> <li>. Positioning systems by Satellite</li> <li>. Electronic chart (ECDIS).</li> </ul>                                                                                       |
| SECTION I:Subject 4: Regulation and norm.                                             |                                                                                                                                                                                                                                                                                  |
| SECTION II: Subject 1:Theoretical foundations of radio communication systems          | <ul style="list-style-type: none"> <li>.Introduction to communications systems.</li> <li>.Concepts</li> <li>.Radiotelephone communications</li> <li>.RF electromagnetic wave propagation.</li> <li>.Antennas</li> <li>.Components/failures of marine radio equipment.</li> </ul> |
| SECTION II: Subject 2:Theoretical fundamentals of navigation aid systems.             | <ul style="list-style-type: none"> <li>.Navigation satellite systems (GNSS).</li> <li>.Automatic Identification System (AIS)</li> </ul>                                                                                                                                          |
| SECTION II: Subject 3:Theoretical fundamentals of maritime radiocommunication systems | <ul style="list-style-type: none"> <li>.Digital Selective Calling (DSC).</li> </ul>                                                                                                                                                                                              |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| According to the STCW including the Amendments of Manila of 2010, column 2 (recognitions, understanding and sufficiency) of picture A-III/6                                                                                                                                                                                                                                                                                                                                                                       | <p>? Operation of all the systems side for the internal communications.</p> <p>? Knowledge of the principles and the procedures of maintenance of the navigation equipment and the systems of internal and external communications.</p> <p>? Theoretical knowledge: operation of the electrical equipment and electronic in inflammable zones.</p> <p>? Practical knowledge: to execute without risks the procedures of maintenance and repair. Detection of failures of operation of the machines, location of failures and measures to prevent the failures.</p> |
| <p>According to the STCW including the Amendments of Manila of 2010, based on electrical systems, electronic and of control at operational level, picture A-III/6 it is added:</p> <p>A subject of alarms and systems of monitoring (regulation and control)</p> <p>A subject of technology of the electronic equipments (Science and Engineering of materials)</p> <p>A subject of electrical risks in the maintenance (electrical Maintenance of the ship)</p>                                                  | ? Hydraulic and electropneumatic systems (Auxiliary equipment of the ship)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| The development and overcoming of these contents, along with the corresponding ones to other matters that include the acquisition of specific competitions of the degree, guarantee the knowledge, understanding and sufficiency of the competitions picked up in picture AIII/2, of Agreement STCW, related to the level of management of Engineering officer of First of Marina Mercante, without limitation of power of the power plant and Engine room chief of Merchant Maritime until a maximum of 3000 KW. | <p>Picture A-III/2 of Agreement STCW.</p> <p>Specification of the minimum norms of competition applicable to the Engine room chiefs and Senior officers of machines of ships whose main power plant has an equal power or superior to 3000 KW</p>                                                                                                                                                                                                                                                                                                                  |

| Planning                                                                                                                        |                                                                |                      |                               |             |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests                                                                                                           | Competencies                                                   | Ordinary class hours | Student?s personal work hours | Total hours |
| Objective test                                                                                                                  | A1 A16 A62 A63 A67<br>A70 B2 B4 B8 B9 C3<br>C9 C10 C11 C12 C13 | 2                    | 13                            | 15          |
| Laboratory practice                                                                                                             | A1 A16 A62 A63 A67<br>A70 B2 B4 B8 B9 C3<br>C9 C10 C11 C12 C13 | 14                   | 24.5                          | 38.5        |
| Workbook                                                                                                                        | A1 A16 A62 A63 A67<br>A70 B2 B4 B8 B9 C3<br>C9 C10 C11 C12 C13 | 0                    | 6                             | 6           |
| Guest lecture / keynote speech                                                                                                  | A1 A16 A62 A63 A67<br>A70 B2 B4 B8 B9 C3<br>C9 C10 C11 C12 C13 | 32                   | 56                            | 88          |
| Personalized attention                                                                                                          |                                                                | 2.5                  | 0                             | 2.5         |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. |                                                                |                      |                               |             |



| Methodologies                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Objective test                 | <p>Test written used for the evaluation of the learning, whose distinguishing outline is the possibility of determining if the given answers are or noncorrect. It constitutes a capacity, measuring instrument, made rigorously that allows to evaluate knowledge, skills, yield, etc.</p> <p>The objective test can combine different types from questions: questions of multiple answer, brief answer, and/or development. Also it is possible only to be constructed with one type of some of these questions.</p> |
| Laboratory practice            | <p>Accomplishment of exercises of practical character related to the explained theoretical concepts in the skillful sessions.</p> <p>The practices will not compute in the evaluation of the matter, but its accomplishment, and at least a 80%, are necessary condition for the overcoming of the matter.</p>                                                                                                                                                                                                         |
| Workbook                       | Documentation facilitated to the students where it is deepened on the contents to unroll in the matter.                                                                                                                                                                                                                                                                                                                                                                                                                |
| Guest lecture / keynote speech | <p>Oral exhibition of the matter complemented with the use of presentations audiovisuais and the introduction of some questions addressed to the students, in order to transmit knowledge and to facilitate the learning.</p> <p>Within this dynamics the intervention of the students will be open for the accomplishment of questions or commentaries, that could give rise to open debates.</p>                                                                                                                     |

| Personalized attention                                |                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                                         | Description                                                                                                                                                                                                                                                                                                                                                              |
| Guest lecture / keynote speech<br>Laboratory practice | <p>The tracking of the practices will be realised continuously in the classroom, however, if it is sighted necessary, will settle down additional positions of a guardian of individual character or in group very reduced for its pursuit and the resolution of the doubts that exceed they, or on the theoretical aspects that reach them, they have the students.</p> |

| Assessment     |                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |
|----------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Methodologies  | Competencies                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qualification |
| Objective test | A1 A16 A62 A63 A67<br>A70 B2 B4 B8 B9 C3<br>C9 C10 C11 C12 C13 | <p>A materia divídese en dous bloques que se avaliarán de forma independente.</p> <p>En cada unha das partes realizarase polo menos un exame parcial para aqueles alumnos cunha asistencia de polo menos un 80% das clases. A superación dos exames parciais permitirá librar materia para o exame final, o cal tamén se dividirá en dous bloques.</p> <p>A nota da materia será a media aritmética das notas dos dous bloques, sendo a nota mínima necesaria para compensar unha parte coa outra de 4,5.</p> <p>En caso de obter unha nota inferior a 4,5 nunha das partes, a nota da asignatura será a menor das obtidas en ambas as partes.</p> <p>Con esta metodoloxíase evaluaranse as competencias A1 A16 A62 A70 B2 B4 B8 B9 C3 C9 C10 C11 C12 C13 .</p> | 100           |

| Assessment comments |
|---------------------|
|---------------------|



Students who are recognised as having a part-time job and who have been granted academic exemption from attendance will not be required to attend the partial examinations. However, a series of tutorials (either in person or not) must be agreed with the teacher during the course in order to accredit the monitoring of the subject.

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

Continuous evaluation: A "preliminary examination" must be carried out with the data provided by the students. In order to carry out this examination, it is essential that the proposed tasks be submitted.

1st opportunity: continuous evaluation as in paragraph 4 (adding practices + tasks + test)

2nd chance: same as 1st chance

A) full-time students:

attendance/participation in the corresponding tasks and practical training: minimum 80%.

B) students with a part-time education and academic exemption from attendance, the second establishes a "RULE REGULATING OR REMOVING DEDICATION TO THE STUDY OF TWO GRAE STUDENTS OF THE NA UDC (arts.2.3;3.b e 4.5)(29/5/212):

assistance/participation in the corresponding tasks or practices minimum 80%. If you are unable to attend the maximum number of sessions, you may arrange for tutoring.

"The fraudulent performance of the evaluation tests or activities, once verified, will directly imply the qualification of failing "0" in the subject in the corresponding call, thus invalidating any qualification obtained in all the evaluation activities for the extraordinary call".

## Sources of information

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | MANUAL DE COMUNICACIONES MARÍTIMAS - F. Louzán, I. Baniela (2009). INTEGRATED BRIDGE SYSTEMS VOL 1: RADAR AND AIS - The Nautical Institute INTEGRATED BRIDGE SYSTEMS VOL 2: ECDIS AND POSITIONING - The Nautical Institute RADAR NAVIGATION AND MANEUVERING BOARD MANUAL ? National Imagery And Mapping Agency<br>( <a href="http://msi.nga.mil/NGAPortal/MSI.portal?_nfpb=true&amp;_pageLabel=msi_portal_page_62&amp;pubCode=0008">http://msi.nga.mil/NGAPortal/MSI.portal?_nfpb=true&amp;_pageLabel=msi_portal_page_62&amp;pubCode=0008</a> ) RADAR AND ARPA MANUAL ? A. G. Bole & W.O. Dineley BRIDGE TEAM MANAGEMENT. A PRACTICAL GUIDE ? Capt. A.J. Swift ? The Nautical Institute THE ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS): AN OPERATIONAL HANDBOOK - Adam Weintrit CONVENIO INTERNACIONAL PARA LA SEGURIDAD DE LA VIDA HUMANA EN EL MAR (SOLAS) |
| <b>Complementary</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

(\*)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.