



## Teaching Guide

| Teaching Guide           |                                            |        |                       |           |
|--------------------------|--------------------------------------------|--------|-----------------------|-----------|
| Identifying Data         |                                            |        |                       | 2018/19   |
| Subject (*)              | Ship Hydrodynamics                         |        | Code                  | 631480212 |
| Study programme          | Mestrado Universitario en Enxeñaría Mariña |        |                       |           |
| Descriptors              |                                            |        |                       |           |
| Cycle                    | Period                                     | Year   | Type                  | Credits   |
| Official Master's Degree | 2nd four-month period                      | First  | Optional              | 3         |
| Language                 | Spanish                                    |        |                       |           |
| Teaching method          | Face-to-face                               |        |                       |           |
| Prerequisites            |                                            |        |                       |           |
| Department               | Ciencias da Navegación e Enxeñaría Mariña  |        |                       |           |
| Coordinador              | Baalina Insua, Alvaro                      | E-mail | alvaro.baalina@udc.es |           |
| Lecturers                |                                            | E-mail |                       |           |
| Web                      |                                            |        |                       |           |
| General description      |                                            |        |                       |           |

## Study programme competences

| Code | Study programme competences                                                                                                                                                                                                                                                                    |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A20  | Capacidade para desenrolar tarefas de análise e síntese de problemas teórico-prácticos en base a conceptos adquiridos noutras disciplinas do ámbito marítimo, mediante fundamentos físico-matemáticos.                                                                                         |
| A22  | Capacidade para desenrolar métodos e procedementos para gañar competitividade na industria marítima.                                                                                                                                                                                           |
| A24  | Capacidade para detectar necesidades de mellora e innovar sistemas enerxéticos buscando alternativas viables aos sistemas convencionais e implementar cos métodos, técnicas e tecnoloxías emerxentes máis eficientes para o apoio, asistencia e supervisión da Enxeñaría Mariña.               |
| B1   | Aprender a aprender.                                                                                                                                                                                                                                                                           |
| B2   | Resolver problemas de forma efectiva.                                                                                                                                                                                                                                                          |
| B3   | Comunicarse de maneira efectiva nun entorno de traballo.                                                                                                                                                                                                                                       |
| B4   | Traballar de forma autónoma con iniciativa.                                                                                                                                                                                                                                                    |
| B5   | Traballar de forma colaborativa.                                                                                                                                                                                                                                                               |
| B6   | Comportarse con ética e responsabilidade social como cidadán e como profesional.                                                                                                                                                                                                               |
| B7   | Capacidade para interpretar, seleccionar e valorar conceptos adquiridos noutras disciplinas do ámbito marítimo, mediante fundamentos físico-matemáticos.                                                                                                                                       |
| B10  | Comunicar por escrito e oralmente os coñecementos procedentes da linguaxe científica.                                                                                                                                                                                                          |
| B11  | Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razoamento crítico e de comunicar e transmitir coñecementos, habilidades e destrezas.                                                                                                                      |
| B12  | Posuír e comprender coñecementos que aporten unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación                                                                                                                     |
| B13  | Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidas dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo                                                    |
| B14  | Que os estudantes sexan capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partires dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vencelladas á aplicación dos seus coñecementos e xuízos |
| B15  | Que os estudantes saiban comunicar as súas conclusións e os coñecementos e razóns últimas que as sustentan a públicos especializados e non especializados dun xeito claro e sin ambigüidades                                                                                                   |
| B16  | Que os estudantes posúan as habilidades de aprendizaxe que lles permitan continuar estudando dun xeito que haberá de ser en grande medida autodirixido ou autónomo.                                                                                                                            |
| C1   | Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.                                                                                                                                                                                       |
| C2   | Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.                                                                                                                                                                                                            |
| C4   | Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.                                         |



|    |                                                                                                                                               |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------|
| C6 | Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.             |
| C7 | Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.                                                              |
| C8 | Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade. |
| C9 | Falar ben en público                                                                                                                          |

| Learning outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                             |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------|-----|
| Learning outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      | Study programme competences |     |
| <p>Coñecer os fundamentos da hidrodinámica do buque, que inclúe todo o relativo á resistencia ao avance , as súas compoñentes e os factores que interveñen nela, así como á propulsión e saber aplicar estes coñecementos na práctica e as súas implicacións no deseño, comportamento e operativa do buque.</p> <p>Xestionar problemas e describir o comportamento e evolución da hidrodinámica mediante ferramentas físico-matemáticas.</p> <p>Coñecer a terminoloxía propia dentro deste ámbito de estudo.</p> | AC20 | BC1                         | CC1 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AC22 | BC2                         | CC2 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AC24 | BC3                         | CC4 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC4                         | CC6 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC5                         | CC7 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC6                         | CC8 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC7                         | CC9 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC10                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC11                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC12                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC13                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC14                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC15                        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | BC16                        |     |

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sub-topic                                                                                                                                                                                                                                                                                                                              |
| Hydrodynamics and propulsion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1.-Hull sizing and optimization<br>3.-Propeller project. Systematic series.<br>3.- Wake configuration<br>4.-Cavitation, noise and vibration.<br>5.-Resistance. Appendices.<br>6.-Propeller-hull interaction.<br>7.-Estimated propulsion power.                                                                                         |
| <p>The previous topics fulfil with the column 2, "Knowledge, understanding and proficiency", of the Manila amendments to the STCW Code, of the following Table (see sub-topic in the right column):</p> <p>The competences acquisition established in Column 1 of the respective STCW Table, are completed with the overcoming of the contents included in the following complementary subjects to this one: Propulsion systems, Maintenance engineering, Advanced control of marine systems, Electrical systems of marine propulsion, Maritime equipment and services.</p> | <p>Table A-III/2. Specification of minimum standard of competence for chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more</p> <p>Function: Marine engineering at the management level.</p> <p>Competences: All those included in that function</p> |

| Planning              |              |                      |                               |             |
|-----------------------|--------------|----------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies | Ordinary class hours | Student's personal work hours | Total hours |



|                                |                                                                               |    |    |    |
|--------------------------------|-------------------------------------------------------------------------------|----|----|----|
| Guest lecture / keynote speech | B1 B2 B3 B4 B5 B6<br>B7 B10 B11 B12 B13<br>B14 B15 B16 C1 C2<br>C4 C6         | 14 | 14 | 28 |
| Problem solving                | A20 A22 A24 B1 B2<br>B3 B4 B5 B6 B7 B10<br>B11 B12 B13 B14<br>B15 B16         | 7  | 14 | 21 |
| Supervised projects            | A22 A24 B2 B3 B4 B5<br>B6 B7 B10 B11 C1<br>C2 C4 C6 C7 C8 C9                  | 7  | 7  | 14 |
| Objective test                 | A20 A22 A24 B1 B2<br>B3 B4 B5 B6 B7 B10<br>B11 B12 B13 B14<br>B16 C1 C2 C4 C6 | 2  | 6  | 8  |
| Personalized attention         |                                                                               | 4  | 0  | 4  |

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

| Methodologies                  |                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                  | Description                                                                                                                                                                                                                                                                                                       |
| Guest lecture / keynote speech | There will be a detailed explanation of the contents of the material, distributed across topics. The student will have a typed copy of the subject matter in each keynote session. Students are encouraged to participate in class, through comments linking the theoretical contents with real life experiences. |
| Problem solving                | Problems will be solved for each item proposed, allowing the application of mathematical models appropriate to each case, including managing software, applying the most appropriate assumptions, the theoretical relation developed in lectures and relation with professional practice                          |
| Supervised projects            | Problems more difficult than those solved in class or issues of special relevance.                                                                                                                                                                                                                                |
| Objective test                 | The degree of acquired knowledge about the contents assessed, taking into account both theory and problem solving.                                                                                                                                                                                                |

| Personalized attention                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Supervised projects<br>Problem solving | <p>The personalized attention related with the methodologies that contemplate it, aims to encourage maximum interaction with students, in order to optimize their effort and improve their learning.</p> <p>Through this interaction, together with the other evaluation processes, the degree of learning of the subject competences will be determined, allowing personalized attention to those students who most need it through individualized tutoring, whose convocation will be held in with involved students.</p> <p>Regardless of the face-to-face tutoring programmed by the teacher, the student can go to tutoring, as many times as he wants, and at a time compatible with teaching, research and management professor activities.</p> <p>In accordance with the "norma que regula o réxime de dedicación ao estudo dos estudantes de grao na UDC" (Art.3.b e 4.5) and ""normas de avaliación, revisión e reclamación das cualificacións dos estudos de grao e mestrado universitario? (Art. 3 e 8b), students with part-time recognition and academic exemption from attendance exemption may participate in a personalized and flexible system of mentoring and evaluation tutorials in order to determine the degree of competency learning achieved.</p> <p>Regarding with this matter, the tutorials will serve to carry out those activities included within the methodology of supervised projects and problems solution.</p> |

| Assessment    |              |             |               |
|---------------|--------------|-------------|---------------|
| Methodologies | Competencies | Description | Qualification |



|                                |                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
|--------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Supervised projects            | A22 A24 B2 B3 B4 B5<br>B6 B7 B10 B11 C1<br>C2 C4 C6 C7 C8 C9                  | Presentation and defense of the project. Structure, neatness, originality and expository method are valued.<br>Assessed competencies: A20; A22; A24; B2; B3; B4; B5; B6; B7; B10; B11; C1; C6                                                                                                                                                                                                                                                                                                                                               | 10 |
| Guest lecture / keynote speech | B1 B2 B3 B4 B5 B6<br>B7 B10 B11 B12 B13<br>B14 B15 B16 C1 C2<br>C4 C6         | Attendance at the lectura sessions will report as part of the final qualification<br>Assessed competencies: B1, B2, B3, B4, B5, B6, B7, B10, B11, C1, C2, C4, C6                                                                                                                                                                                                                                                                                                                                                                            | 10 |
| Problem solving                | A20 A22 A24 B1 B2<br>B3 B4 B5 B6 B7 B10<br>B11 B12 B13 B14<br>B15 B16         | Problem solving, if possible, with software.<br>Assessed competencies: A20; A22; A24; B2; B4; B5; B7; B11                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10 |
| Objective test                 | A20 A22 A24 B1 B2<br>B3 B4 B5 B6 B7 B10<br>B11 B12 B13 B14<br>B16 C1 C2 C4 C6 | The degree of acquired knowledge about the learning contents is assessed, taking into account both the theoretical part and the problems. Understanding of basic topics, problem solving strategies , evolution and capacity to analyse critically are assessed as well.<br><br>Two term exams contribute to 70% of the qualification. Final objective test with the same 70 % contribution is programmed for students who failed term exams.<br>Assessed competencies: A20; A22; A24; B1; B2; B3; B4; B5; B6; B7; B10; B11; C1; C2; C4; C6 | 70 |

## Assessment comments

The official tests of the first chance (May-June) will collect the different assessment methodologies and must be completed by those students who have not fully passed the continuous assessment. This test will be designed in such a way that the student can deal with the methodologies of problem-solving and objective test, where he has not reached 30% of the total rating. The students required to attend the official tests of the second chance (June-July) will retain the qualification achieved in all methodologies, except for the one obtained in the objective tests of the first chance, which will be replaced by the 2nd. In the same way, you can only opt for honours if the maximum number of these for the corresponding course is not covered in full at the first chance. For the students with recognition of part-time dedication and academic exemption of attendance exemption, the qualification obtained in the activities associated with the personalized tutoring system will correspond to the evaluation of the methodology of problem-solving and objective tests, with 30 % and 70 % of total rating, respectively. The evaluation criteria listed in Table A-III / 2, of the STCW Code, as amended, relating to this matter will be taken into account when designing and conducting evaluation.

## Sources of information

|                      |                                                                                                                                                                                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | <ul style="list-style-type: none"> <li>- Rawson and Tupper (2001). Basic Ship Theory. Oxford. Butterworth-Heinemann</li> <li>- John Carlton (2007). Marine Propellers and Propulsion. Butterworth-Heinemann</li> <li>- Volker Bertram (2011). Practical Ship Hydrodynamics. Butterworth-Heinemann; 2 edition</li> </ul> |
| <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.