| Teaching Guide | | | | | |
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| Identifying Data | | | | | 2022/23 |
| Subject (*) | Camiños | | | Code | 632G02033 |
| Study programme | Grao en Tecnoloxía da Enxeñaría Civil | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | | Type | Credits |
| Graduate | 1st four-month period | Third | | Obligatory | 6 |
| Language | English | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Enxeñaría Civil | | | | |
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| Web | | | | | |
| General description | In this subject will be taught the basic concepts that allow to know the problematic of the design and construction of the different elements of a highway.<br>The teaching guide is available in English, Spanish and Galician. In case of discrepancy, the information indicated in the Spanish version shall prevail. | | | | |

| Study programme competences | |
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| Code | Study programme competences |
| A27 | Conocimiento de la problemática de diseño, cálculo, proyecto y construcción de los distintos elementos de una carretera: trazado, sección transversal, explanaciones, firmes, intersecciones, enlaces, análisis de su capacidad. |
| A28 | Conocimientos de los métodos de conservación y explotación de carreteras y aeropuertos. |
| A30 | Capacidad para entender y analizar la influencia de las infraestructuras de transporte en los procesos territoriales. |
| B1 | Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio |
| B2 | Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio |
| B3 | Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética |
| B4 | Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado |
| B5 | Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía |
| B6 | Resolver problemas de forma efectiva. |
| B7 | Aplicar un pensamiento crítico, lógico y creativo. |
| B8 | Trabajar de forma colaborativa. |
| B9 | Comportarse con ética y responsabilidad social como ciudadano y como profesional. |
| B10 | Comunicarse de manera efectiva en un entorno de trabajo. |
| B11 | Entender y aplicar el marco legal de la disciplina. |
| B12 | Comprensión de la necesidad de actuar de forma enriquecedora sobre el medio ambiente contribuyendo al desarrollo sostenible. |
| B13 | Compresión de la necesidad de analizar la historia para entender el presente. |
| B14 | Capacidad para organizar y dirigir equipos de trabajo así como de integrarse en equipos multidisciplinares. |
| B15 | Claridad en la formulación de hipótesis. |
| B16 | Capacidad de autoaprendizaje mediante la inquietud por buscar y adquirir nuevos conocimientos, potenciando el uso de las nuevas tecnologías de la información y así poder enfrentarse adecuadamente a situaciones nuevas. |
| B17 | Capacidad para aumentar la calidad en el diseño gráfico de las presentaciones de trabajos. |

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| B18 | Capacidad para aplicar conocimientos básicos en el aprendizaje de conocimientos tecnológicos y en su puesta en práctica. |
| B19 | Capacidad de realizar pruebas, ensayos y experimentos, analizando, sintetizando e interpretando los resultados. |
| C1 | Expresarse correctamente, tanto de forma oral como por escrito, en las lenguas oficiales de la comunidad autónoma. |
| C2 | Dominar la expresión y la comprensión de forma oral e escrita de un idioma extranjero. |
| C3 | Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de la vida. |
| C4 | Desarrollarse para el ejercicio de una ciudadanía abierta, culta, crítica, comprometida, democrática y solidaria, capaz de analizar la realidad, diagnosticar problemas, formular e implantar soluciones basadas en el conocimiento y orientadas al bien común. |
| C5 | Entender la importancia de la cultura emprendedora y conocer los medios al alcance de las personas emprendedoras. |
| C6 | Valorar críticamente el conocimiento, la tecnología y la información disponible para resolver los problemas con que deben enfrentarse. |
| C7 | Asumir como profesional y ciudadano la importancia del aprendizaje a lo largo de la vida. |
| C8 | Valorar la importancia que tiene la investigación, la innovación y el desarrollo tecnológico en el avance socioeconómico y cultural de la sociedad. |

| Learning outcomes | | | |
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| Learning outcomes | Study programme competences | | |
| It allows the knowledge of roads from the point of view of the project, construction and conservation. | A27 | B1 | C1 |
| It allows to acquire the basic knowledge of grades. | A28 | B2 | C2 |
| It allows to know the influence of the traffic in the operation of a highway. | A30 | B3 | C3 |
| It also allows to acquire the fundamental knowledge about the materials usually used road pavements. | | B4 | C4 |
| It gives the student basic concepts of the air and road transport system. | | B5 | C5 |
| | | B6 | C6 |
| | | B7 | C7 |
| | | B8 | C8 |
| | | B9 | |
| | | B10 | |
| | | B11 | |
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| Contents | |
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| Topic | Sub-topic |
| 1. Basic concepts | Definition of road. Types of road (this section includes considerations on autonomous and connected vehicles). Elements of the road. Infrastructure and superstructure (the basic concepts of drainage, signalling, beaconing, safeguarding, etc are introduced in this section) |
| 2. Traffic engineering | Basic traffic characteristics (volume, flow rate, speed and density). Traffic studies. Capacity and level of service (LOS) under uninterrupted flow (according to HCM 2010 updated to 6TH Edition). |
| 3. Road design | Basic design criteria. Horizontal and vertical alignment. General recommendations. Cross sectional elements. |
| 4. Earthworks | Earthworks construction. Load-bearing capacity. Soil stabilization. |

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| 5. Road pavements | Pavement structure. Binders. Aggregates. Granular layers. Treated layers for bases and subbases. Surface treatments. Bituminous mixtures. Concrete pavements. Pavement design according to standard 6.1-IC. Surface characteristics. Conservation. |
| 6 y 7. Transport | Introduction. Road transport. Air transport. |

| Planning | | | | |
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| Methodologies / tests | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Introductory activities | B9 B13 B1 B2 C8 | 1.5 | 0 | 1.5 |
| Guest lecture / keynote speech | A27 A28 A30 B8 B10 B11 B12 B14 B15 B3 B4 B5 B6 B7 B16 B17 B18 B19 C2 C3 C4 C5 C6 C7 | 39.75 | 31.75 | 71.5 |
| Laboratory practice | B8 B9 B10 B11 B12 B14 B15 B2 B3 B7 C8 | 1 | 0 | 1 |
| Problem solving | A27 A28 B11 B15 B1 B2 B3 B4 B6 B7 B17 C1 C2 C3 C7 | 12 | 18 | 30 |
| Supervised projects | A27 A30 B9 B10 B11 B12 B2 B3 B4 B5 B6 B7 B17 C1 C2 | 0 | 16 | 16 |
| Objective test | B9 B10 B11 B15 B1 B2 B3 B4 B5 B7 C1 C2 | 4 | 24 | 28 |
| Personalized attention | | 2 | 0 | 2 |
| (*)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 |
| Introductory activities | An initial session is held to present the course program and the organization of the course, presenting the basic bibliography, the form of evaluation and resolving any doubts that students may have before facing the subject. |
| Guest lecture / keynote speech | Theoretical sessions in which the main contents of the course are transmitted. During these sessions, student participation is encouraged through the generation of short questions as well as the proposal of practical examples. |
| Laboratory practice | If the planning of the subject allows it, a visit to the Roads Laboratory will be made, where students will be able to see some of the tests explained theoretically in the classroom. |
| Problem solving | During the course, sessions are held periodically during which exercises are presented to reinforce the theoretical knowledge explained in the lectures. In these sessions, the exercises are solved and any doubts that may arise during the course are resolved. These sessions serve as a base for the correct development of a series of practices that the student will have to hand in to be evaluated. |
| Supervised projects | Presentation of different exercises related to the different topics of the course, which will be presented in class and must be delivered to the teachers on the dates indicated throughout the course. |
| Objective test | A final objective test is given at each opportunity to check the knowledge acquired by the students on the subject matter explained in the lectures and in the problem solving sessions.<br>Likewise, objective tests of continuous evaluation of the various topics explained in class or of the problems explained in class may be carried out throughout the course, with prior notice. |

| Personalized attention | |
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| Methodologies | Description |

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| Supervised projects<br>Problem solving | Personalized attention is provided to solve individual doubts that any of the students may have about the problems solved or any of the theoretical issues raised in the course. On the other hand, personalized attention is a tool for the support of students during the realization of tutored work, problem solving, etc. that may arise during the course. |

| Assessment | | | |
|---|---|---|---|
| Methodologies | Competencies | Description | Qualification |
| Objective test | B9 B10 B11 B15 B1 B2 B3 B4 B5 B7 C1 C2 | Theoretical and practical content evaluation tests carried out at the end of the subject and/or continuous evaluation tests carried out throughout the course.<br><br>The final objective test will have a weight of 40% and it will be necessary to obtain a minimum qualification of 3.5 points in it in order to pass the subject.<br><br>The objective tests of continuous evaluation will have a weight of 15% and it will not be necessary to obtain a minimum qualification in them in order to pass the subject. | 55 |
| Supervised projects | A27 A30 B9 B10 B11 B12 B2 B3 B4 B5 B6 B7 B17 C1 C2 | Resolution of the works proposed to the students throughout the course. Several tutored works could be proposed. | 15 |
| Problem solving | A27 A28 B11 B15 B1 B2 B3 B4 B6 B7 B17 C1 C2 C3 C7 | Resolution of individualized exercise reports of the topics covered in the course. | 30 |

| Assessment comments |
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| To determine the final grade of the course (minimum 5.0 out of 10 to pass the subject), the following elements will be evaluated, weighted according to their corresponding weights:<br>- Problem solving (20%): during the course, a maximum of 2 exercise reports (on traffic, on layout and/or on pavements) will be proposed. The statements will be particularized for each student. The resolution will be individual. The delivery will be via Moodle on the date and in the form that will be indicated throughout the course.<br>- Supervised assignments (15%): a maximum of 3 supervised assignments (on cross section elements, on road nodes and/or on layout, dynamic and orientation losses) will be proposed throughout the course. The resolution will be individual. The delivery will be via Moodle on the date and form that will be indicated throughout the course.<br>- Objective test (55%): evaluation of the theoretical and/or practical contents:<br>Final objective test (40%): it will be held on the date set in the official calendar and according to the modality indicated in the teaching guide for the subject. In order to pass the subject it will be necessary to obtain a minimum grade of 3.5 points out of 10 in the mentioned test. If this minimum grade is not obtained, the other evaluation elements will not be taken into account. Objective tests of continuous evaluation (15%): there will be a maximum of 2 objective tests of continuous evaluation, with prior notice during the course of the date, form and subjectRegardless of whether the student attends the first opportunity, the second or both, there will be a single date for the delivery and/or completion of the activities included in the "Problem solving" and in the "Tutored work". Likewise, regardless of the opportunity or opportunities to which each student is submitted, the objective tests of continuous evaluation will have a single date of completion. The grade of each one of them will be kept until the second opportunity of the course and will be taken into account in the final grade both in the first and in the second opportunity.<br>Students may choose not to do a continuous assessment and take only the final objective test, which in this case will weigh 100% and a minimum score of 5.0 out of 10 will be required to pass the subject. This is also valid for students enrolled part-time, etc. |

| Sources of information |
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| **Basic** | - Kraemer et al. (2004). Ingeniería de Carreteras. Volumen I. McGraw-Hill<br>- Profesores de la asignatura / profesores da materia (). Transparencias de la asignatura / Transparencias da materia.<br><br>- Ministerio de Fomento (). Instrucción de Carreteras. Norma 3.1-IC. Trazado. BOE del 4 de marzo 2016<br>- Kraemer et al. (2004). Ingeniería de Carreteras. Volumen II. McGraw-Hill<br>- Transportation Research Board (). Highway Capacity Manual - 2010 y 6TH Edition. Transportation Research Board<br>- Juan de Oña et al. (2004). Problemas resueltos de drenaje, explanaciones y firmes. Grupo editorial universitario<br>- Marcelino Conesa Lucerga y Alfredo García García (1987). Diseño geométrico de carreteras. Universidad Politécnica de Valencia<br>- Ministerio de Fomento (). Pliego de prescripciones técnicas generales para obras de carreteras y puentes, PG-3. Parte 3ª: Explanaciones, Parte 4ª: Drenaje y Parte 5ª: Firmes.<br>- Ministerio de Fomento (2003). ORDEN FOM/3459/2003, de 28 de noviembre, por la que se aprueba la Norma 6.3-IC «REHABILITACIÓN DE FIRMES», de la Instrucción de Carreteras.. BOE nº 297 de 12/12/2003<br>- Ministerio de Fomento (2003). ORDEN FOM/3460/2003, de 28 de noviembre, por la que se aprueba la Norma 6.1-IC «SECCIONES DE FIRME», de la Instrucción de Carreteras.. BOE nº 297 de 12/12/2003<br>- Juan de Oña et al. (2005). Problemas resueltos de caminos y aeropuertos. Trazado. Grupo editorial universitario |
| **Complementary** | |

| **Recommendations** |
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| **Subjects that it is recommended to have taken before** |
| Debuxo en enxeñaría civil I/632G02003<br>Física aplicada I/632G02004<br>Física aplicada II/632G02005<br>Xeoloxía aplicada/632G02006<br>Álxebra lineal I/632G02007<br>Álxebra lineal II/632G02008<br>Topografía e cartografía/632G02011<br>Mecánica/632G02014<br>Debuxo en enxeñaría civil II/632G02016<br>Materiais de construción I/632G02009<br>Materiais de construción II/632G02010<br>Xeotecnia I/632G02019<br>Xeotecnia II/632G02020 |
| **Subjects that are recommended to be taken simultaneously** |
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| **Subjects that continue the syllabus** |
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| **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.**