



## Teaching Guide

Identifying Data					2015/16
Subject (*)	Física para a Arquitectura 2	Code	630G02013		
Study programme	Grao en Estudos de Arquitectura				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	Second	Obligatoria	6	
Language	SpanishEnglish				
Teaching method	Face-to-face				
Prerequisites					
Department	Tecnoloxía da Construción				
Coordinador	Aragon Fitera, Jorge	E-mail	j.aragon@udc.es		
Lecturers	Aragon Fitera, Jorge Dominguez Diez, Javier Faustino Jaureguizar Ortiz De Zárate, Francisco Lamas Lopez, Valentin López César, Isaac	E-mail	j.aragon@udc.es javier.dominguez@udc.es francisco.jaureguizar@udc.es valentin.lamas@udc.es isaac.lopez@udc.es		
Web					
General description	<p>The subject is divided into theoretical or lectures and practical part. The practical part is taught in small group. Teaching students on mobility programs will accommodate pedagogical conditions and special guardianship papers, as well as testing and assessment tests.</p> <p>In the lectures, the descriptive work of the teacher is dominant. The students have to participate in the development of this lectures in an active way. This work will be completed with the resolution of different exercises on topics suggested by the teacher during practical classes program.</p> <p>For the efficient use and improvement of the subject is essential:</p> <p>A) ATTENDANCE: The ongoing monitoring of both lectures and practices; so that in order to pass the course, you will need achieve a minimum of 80% of total aid.</p> <p>B) WORK SUPERVISED (maximum 2 points): They are divided into two sections</p> <p>AUTO EXERCISES: You will need to raise and resolve student individually at least 3 years of each of the items described in the section of the subject content. Delivery format is at the discretion of each teacher.</p> <p>TESTS: individualized and raised by the teacher throughout the school year without notice. These can be both theoretical and practical.</p> <p>To apply to the FINAL EXAM it is necessary obtain at least a 1 in this section.</p> <p>C) FINAL EXAM (Maximum 8 points): to be held at a date determined by the governing bodies of the ETSAC. This examination will consist of a multiple choice test [2 points.] And an objective test [6 points.], Taking his realization about four hours.</p> <p>Simultaneous compliance with paragraphs A) and B) allow the student to review the filing and obtaining a supplementary note to the final exam. In the July session may submit all students enrolled in the subject matter or may not have exceeded attendance controls. The approval is set in five out of ten possible according to the following breakdown: multiple choice test: 2points, objective test: 6points, supervised work: 2points.</p>				

## Study programme competences

Code	Study programme competences
A8	"Knowledge of the principles of thermodynamics, acoustics and optics adapted and applied to architecture and urbanism "
A9	"Knowledge of the principles of fluid mechanics, hydraulics, electricity and electromagnetism adapted and applied to architecture and urbanism "
A63	Development, presentation and public review before a university jury of an original academic work individually elaborated and linked to any of the subjects previously studied



B1	Students have demonstrated knowledge and understanding in a field of study that is based on the general secondary education, and is usually at a level which, although it is supported by advanced textbooks, includes some aspects that imply knowledge of the forefront of their field of study
B2	Students can apply their knowledge to their work or vocation in a professional way and have competences that can be displayed by means of elaborating and sustaining arguments and solving problems in their field of study
B3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues
B4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist public
B5	Students have developed those learning skills necessary to undertake further studies with a high level of autonomy
B6	Knowing the history and theories of architecture and the arts, technologies and human sciences related to architecture
B10	Knowing the physical problems, various technologies and function of buildings so as to provide them with internal conditions of comfort and protection against the climate factors in the context of sustainable development
C1	Expressing themselves correctly, both orally and in writing, in the official languages of the autonomous region
C3	Using basic tools of information technology and communications (ICT) necessary for the exercise of the profession and for lifelong learning
C5	Understanding the importance of entrepreneurship and knowing the means available to the entrepreneur
C6	Critically evaluate the knowledge, technology and information available to solve the problems they must face
C7	Assuming as professionals and citizens the importance of learning throughout life
C8	Assessing the importance of research, innovation and technological development in the socio-economic advance of society and culture

Learning outcomes			
Learning outcomes	Study programme competences		
FLUID MECHANICS AND HYDRAULIC	A8 A9 A63	B1 B2 B3 B4 B5 B6 B10	C1 C3 C5 C6 C7 C8
HEAT TRANSFER IN REAL WALLS	A12 A49 A54	B1 B2 B3 B4 B5 B6 B7 B10 B11 B12 B20 B28 B29	C3 C4 C6 C7 C8
ACOUSTIC	A8 A9 A63	B1 B2 B3 B4 B5 B6 B10	C1 C3 C5 C6 C7 C8



ELECTRICITY	A8	B1	C1	
	A9	B2	C3	
	A63	B3	C5	
		B4	C6	
		B5	C7	
		B6	C8	
		B10		
		A8	B1	C1
		A9	B2	C3
		A63	B3	C5
B4	C6			
B5	C7			
B6	C8			
B10				

Contents	
Topic	Sub-topic



FLUID MECHANICS AND HYDRAULIC

INTRODUCTION  
HISTORY  
PROPERTIES OF FLUIDS  
HYDROSTATIC  
INTRODUCTION. PRESSURE AT A POINT  
BASIC PRINCIPLES  
FUNDAMENTAL EQUATION  
SUBMERGED SURFACE PRESSURES  
HYDROSTATIC THRUST  
PRESSURE CENTER  
PRISMA PRESSURE  
FUNDAMENTALS OF FLUID FLOW  
INTRODUCTION. RANKINGS FLOW  
LINES, POWER WIRES AND TUBES  
FLOW. DIMENSIONAL EQUATION. UNITS  
ENERGY IN A MOVING FLUID  
BERNOULLI THEOREM  
IDEAL FLUID  
REAL FLUID  
HYDRAULIC POWER  
FLUID FLOW MEASUREMENT  
FLUID FLOW IN PIPES  
INTRODUCTION. LAMINAR AND TURBULENT FLOWS  
DISTRIBUTION OF SPEED. BOUNDARY LAYER  
ADIMENSIONASL NUMBERS. REYNOLDS NUMBER  
SURFACE RESISTANCE. PRIMARY LOAD LOSSES  
GENERAL EQUATION  
MOODY CHART  
HIGH LOAD LOSSES  
BRANCHED PIPING SYSTEM SERIAL, AND PARALLEL. MALLAS  
OPEN CHANNEL FLOW  
FORMULA AND MANNING CHEZY  
FORCES DEVELOPED BY FLUID MOTION  
PRINCIPLES OF MOMENTUM - MOMENTUM  
FORCES ON ELBOWS

HEAT TRANSFER IN REAL WALLS

COMBINED ACTION OF THREE MECHANISMS OF HEAT TRANSFER  
CONDITIONS OF WINTER  
INTRODUCTION  
HEAT TRANSFER THROUGH OPAQUE WALLS  
TEMPERATURE DISTRIBUTION IN THE SIDING  
HEAT TRANSFER AND VENTILATION INFILTRATIONS ARISING FROM LOCAL  
CONDITIONS OF SUMMER  
INTRODUCTION  
HEAT TRANSFER THROUGH OPAQUE WALLS  
THERMAL INERTIA SIDING  
HEAT TRANSFER THROUGH WALLS SEMITRANSSPARENT



ACOUSTIC	<p>SOUND. FUNDAMENTAL CONCEPTS.          AUDITORY PHYSIOLOGY.          PHYSICAL ASPECTS OF SOUND.          SOUND INSULATION.          SOUND DAMPING.          SOUND PACKAGING.          ENERGY SYSTEMS SOUND ABSORBENT.          SOUND ENERGY ABSORBING MATERIALS.          ARCHITECTURAL ACOUSTICS.          CTE - DB-HR</p>
ELECTRICITY	<p>INTRODUCTION          ELECTRIC CHARGE          ACT COULOMB          CONCEPT OF ELECTRIC FIELD. LINES OF FORCE          ELECTRIC POTENTIAL. ELECTRIC POTENTIAL DIFFERENCE          ELECTRICITY          OHM'S LAW          RESISTIVITY          ENERGY IN ELECTRICAL CIRCUITS. ELECTRIC POWER          CURRENT.          AC POWER. C. A. PHASE. C. A. PHASE          DISTRIBUTION NETWORKS          FEATURES. TYPES          LOW VOLTAGE ELECTRICAL INSTALLATIONS          A LOW VOLTAGE SUPPLY BUILDING          PROTECTION SYSTEMS</p>
THEORY OF LIGHT AND COLOR	<p>INTRODUCTION. HISTORY.          RADIO WAVES. FEATURES. CLASSIFICATION.          SPREAD OF LIGHT. FRESNEL-HUYGENS PRINCIPLE. REFLECTION AND REFRACTION.          PHOTOMETRIC QUANTITIES.          EFFECT PURKINJE          LIGHT FIGURES          FLOW. INTENSITY. ILUMINANCIA. ILLUMINANCE          REFLECTANCE, ABSOTANCIA AND TRANSMISSION.          LIGHT AND VISION          THE HUMAN EYE          VISUAL PERFORMANCE FACTORS          GLARE          COLOR TEMPERATURE OF LIGHT          COLOR THEORY</p>

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	A8 A9 A63 B6 B6 B5 B5 B4 B4 B3 B2 B1 B1 B7 B10 B10 B29 C1 C3 C5 C6 C7 C8	2	1	3
Guest lecture / keynote speech	A12 A49 A54	27	40.5	67.5



Problem solving	B2 B3 B4 B5 B6 B7 B10 B11 B12 B20 B28 C3 C4 C6 C7 C8	22	22	44
Objective test	B2 B3 B4 B6 B11 B12 B28 B29 C3 C6	5	0	5
Multiple-choice questions	B2 B3 B4 B6 B7 B12 C3	1	0	1
Diagramming	A49 A54 B1 B3 B4 B29	0	0.5	0.5
Glossary	B1 B3 B6 B7 B10 B11 B12	0	1	1
Supervised projects	A12 A49 A54 B1 B2 B3 B4 B10 B11 B12 B28 B29	2	20	22
Workbook	A12 A49 A54 B1	0	5	5
Personalized attention		1	0	1

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

Methodologies	
Methodologies	Description
Introductory activities	Presentation on the subject, explaining its operation and objectives.
Guest lecture / keynote speech	Classes in which the teacher will present on the Board or of the audiovisual content of theoretical and practical matters
Problem solving	In small group class the teacher will present a series of case studies that will solve, partially or totally, with the help and advice of Professor.
Objective test	Numerical and graphical issues on the contents of the material and the supporting literature will arise. It will assess the level of learning by the student of practical aspects of the subject
Multiple-choice questions	A multiple choice test will assess the level of learning by the student theoretical and practical aspects of the subject.
Diagramming	Brief introductions to each topic seek to relate the contents within the knowledge map of the race course in outline mode
Glossary	O alumno elabora unha folla resumen con definicións, formulación e unidades físicas relacionadas con cada un dos temas da materia.
Supervised projects	Students handed to the teacher at least five unsolved problems of each of the topics of matter, must be made on an individual and personal, will be delivered in paper format A4 manuscript. Serve, along with meeting attendance requirements, have access to additional grade for the course.
Workbook	The student selects and analyzes exercise and / or mechanical theory in the literature basic and further identified by teachers in this guide

Personalized attention	
Methodologies	Description
Supervised projects Problem solving	Is subjected to an exhaustive control assistance and activity of the student. This is to demonstrate the autonomous work with the delivery of a series of fully solved exercises independently, must be at least 3 of each of the topics of matter, will be delivered on dates determined by the teacher in class.  The tutorial schedule for the realization of personalized attention to the student will be exposed in the notice board of the subject.



## Assessment

Methodologies	Competencies	Description	Qualification
Supervised projects	A12 A49 A54 B1 B2 B3 B4 B10 B11 B12 B28 B29	The student will need to raise and resolve individually and customized exercises at least 3 of the items described in the section of the subject content, the teacher will establish in a timely manner throughout the course along with their deadline . The student will need to exceed individualized testing and control raised by the teacher as long academic year, without notice of the completion thereof. These tests may be both theoretical and practical. It is necessary to get at least 1 point to take examinations.	20
Multiple-choice questions	B2 B3 B4 B6 B7 B12 C3	Accuracy in answering ten questions about theoretical and practical aspects with four options, of which only one is correct is desirable. They deducted the wrong answers. A minimum of 5 points is established in this test to pass the course. His calculation of the total valuation of the course is two points [2points.] No materials will be allowed of any kind, beyond pens.	20
Objective test	B2 B3 B4 B6 B11 B12 B28 B29 C3 C6	Three problems or case studies based on the syllabus and bibliography arise, students give numerical answer to each of them; having even represent the results graphically. The computation of the total of the course is six points [6 points.] The exam is individual, non-compliance with this requirement will result in expulsion and implementing regulations. Mobile phones powered by the examination is strictly prohibited. During the development of theoretical questionnaire no materials of any kind will be allowed beyond pens, while for the realization of the practical part form, calculator and drawing materials will be used. Each exercise will be answered and will qualify in a statement DIN A3. Each exercise will be delivered independently, written in indelible ink on A4 and folded. The result is given in manner that is clearly visible, indicating the numeric value with precision and corresponding units. Invalid parties must be clearly void. The solution sheets and sheet title will be written the name of the student and his group to be edited	60

## Assessment comments

For a favorable assessment the student must complete the different parts and attendance to introduce themselves, to a minimum of 80% of the total. The marking criteria are adapted to the reality of professional derivatives. As a general rule misconceptions are valued according to their severity, and may nullify the exercise. Also relevant to the commission of a numerical error, since the practice seeks concrete results. In this regard it is noted that a mistake of sign means an error of 200%.

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objective test: 6 points supervised works: 2 points

## Sources of information



<b>Basic</b>	<ul style="list-style-type: none"> <li>- Mataix, C (1970). Mecánica de fluidos y máquinas hidráulicas. Madrid. Editorial Harla</li> <li>- Varios (2008). Fundamentos Físicos de la Arquitectura I. Departamento de Tecnología de la Construcción. ETSAC</li> <li>- Freire Tellado, M. &amp; Muñoz Vidal, M (2007). Introducción a las condiciones Térmicas en Edificación . Departamento de Tecnología de la Construcción . UDC</li> <li>- Varios (). Código Técnico de la Edificación . Ministerio de Vivienda</li> <li>- Josse, R (). La acústica en la construcción. Editorial Gustavo Gili.</li> <li>- Guerrero, A (). Instalaciones eléctricas en las edificaciones. Editorial McGraw-Hill</li> <li>- Ramírez Vázquez, J (). Luminotecnia. Editorial Ceac</li> </ul>
<b>Complementary</b>	<ul style="list-style-type: none"> <li>- Augé, R. (). Curso de electricidad general. Editorial Paraninfo</li> <li>- Agüera Soriano (). Mecánica de fluidos. Editorial Ciencia y Distribución</li> <li>- Giles, R. V (1982). Mecánica de fluidos e hidráulica. Editorial McGraw-Hill. Mexico</li> <li>- López Hernández, E &amp; Muñoz Vidal, M (1994). Introducción a las instalaciones de edificación. Departamento de Tecnología de la Construcción. A Coruña</li> <li>- Bueche, F. J (). Física para estudiantes de ciencias e ingeniería. Editorial McGraw-Hill.</li> <li>- Manuel Margarida (). Aislamiento térmico. Editorial Etasa.</li> <li>- Linares, J. &amp; Lloppis Regna (). Fundamentos de acústica. Universidad Politécnica de Valencia</li> </ul>

### Recommendations

#### Subjects that it is recommended to have taken before

Physics 1/630G01008

#### Subjects that are recommended to be taken simultaneously

Proxectos 3/630G01011

Análise Arquitectónico 1/630G01012

Xeometría da Forma Arquitectónica/630G01014

Historia da Arte/630G01015

#### Subjects that continue the syllabus

Estruturas 1/630G01019

#### Other comments

& For proper monitoring of the subject is necessary prior mastery of the following topics by the students: - Logical Reasoning. - Unit systems. - Geometry and Trigonometry. - Derivation and integration. - Solving systems of equations. - Introduction to building materials.&

(\*)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.