Teaching guide

IDENTIFICATION DETAILS

Degree:	Architecture
Scope	Architecture, construction, building and urban planning, and civil engineering
Faculty/School:	Higher Polytechnic School
Course:	APPLIED MATHEMATICS
Type:	Basic Training
ECTS credits:	6
Year:	2
Code:	3723
Teaching period:	Third semester
Subject:	Mathematics
Module:	Propaedeutical
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	150

SUBJECT DESCRIPTION

This course establishes the physical-mathematical concepts, corresponding to the more theoretical technical topics that an architect must know and apply in many situations of his projects.
It is therefore a subject with a strong mathematical, instrumental and practical nature, although it will focus primarily on architectural applications. In any case, this subject will not focus on theoretical concepts, which, although important and due to the limited workload, require a practical application of them, with special emphasis on those concepts that are immediately used.

GOAL

We want students to acquire a physical-mathematical culture in which the concepts that govern the world of construction and technology are present.
That he is able to perform with ease in handling the different mathematical units and laws, which must necessarily accompany any technical result.
Learn the meaning of the mathematical modeling process, as a means of representing abstract concepts in their final form of application to a project.

PRIOR KNOWLEDGE

To study the subject and obtain optimal use of the subject, you must have a level of knowledge sufficiently provided by the subject of Fundamental Mathematics in the first year.

COURSE SYLLABUS

The course consists of the following main blocks:
BLOCK 0: VECTOR ANALYSIS. Basic concepts.
BLOCK I: ACOUSTICS 1. Introduction. 1.1. Nature of sound. 1.2. Sound propagation and acoustic quantities. 1.3. Human perception of sound. 1.4. Reflection, transmission and diffraction of sound waves. 2. Sound absorption. 2.1. Sound absorption coefficients. 2.2. Absorption due to air. 2.3. Total sound absorption in an enclosure. 3. Architectural acoustics: Introduction. 3.1. Reverberant and anechoic enclosures. 3.2. Sound insulation: ways of penetrating sound. 3.3. Acoustic conditioning: reverberant field and direct field. 4. Architectural acoustics: Acoustic insulation. 4.1. Specific acoustic insulation. 4.2. Gross acoustic insulation against airborne noise. 4.3. Law of mass. 5. Architectural acoustics: Acoustic conditioning. 5.1. Normalized reverberation time for a frequency. 5.2. Sabine's formula. 5.3. Optimal reverberation time.
BLOCK II: ELASTICITY 1. Introduction. 1.1. Introduction to Elasticity. 1.2. The effort. 1.3. The deformation. 1.4. Behavior of materials. 2. Stress theory. 2.1. Definition of Effort. 2.2. Tangential effort and normal effort. 2.3. Stress tensor. 2.4. Main Efforts and Main Directions of Effort. 2.5. Mohr's circles.
BLOCK III: OPTICS 1. Introduction. 1.1. Nature of light. 1.2. Radiation spectrum. 1.3. Optics in architecture. 2. Laws of geometric optics. 2.1. Law of Refraction. 2.2. Law of Reflection. 2.3. Refraction on a sheet of plano-parallel faces. 2.4. Refraction and dispersion in prisms. 3. Lenses. 3.1. Types of lenses. 4. Mirrors.

EDUCATION ACTIVITIES

Theoretical classes: Master classes taught by the teacher.
Problem classes: Resolution by the teacher of as many problems as possible, proposing a set of them for the student to solve.
Tutored personal learning: Personalized student attention to review the contents explained in class, answer questions or discuss specific topics in order for the student to achieve the objectives set by the teacher.
Papers and/or oral presentations: Preparation of papers in groups of students. The works and their content will be detailed in class. During theory classes, the student will be introduced to the content of the subject, in accordance with the course program. The teacher will present the topics synoptically through master lessons and the student must make notes on the above in relation to the content of the subject and the personal work activity carried out.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
60 Horas	90 Horas

SKILLS

Basic Skills

Students must have demonstrated knowledge and understanding in an area of study that is founded on general secondary education. Moreover, the area of study is typically at a level that includes certain aspects implying knowledge at the forefront of its field of study, albeit supported by advanced textbooks

Students must be able to apply their knowledge to their work or vocation in a professional manner and possess skills that can typically be demonstrated by coming up with and sustaining arguments and solving problems within their field of study.

Students must have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that include reflections on pertinent social, scientific or ethical issues

Students must be able to convey information, ideas, problems and solutions to both an expert and non-expert audience

Students must have developed the learning skills needed to undertake further study with a high degree of independence

General Skills

Specific skills

Applied knowledge of numerical calculus, analytical and differential geometry and algebraic methods.

Appropriate and applied knowledge to architecture and urban planning of the principles of general mechanics, statics, mass geometry and vector and tensor fields.

Appropriate and applied knowledge to architecture and urban planning of the principles of thermodynamics, acoustics and optics.

LEARNING RESULTS

Know the main laws of elasticity and their application to structures and soil mechanics.

Know and understand the theoretical models that lead to the laws that govern Elasticity processes.

Understand, know how to apply and solve the problems that arise from wave geometry, both in the phases prior to the acoustic project and in its development.

Know and understand the application of the fundamental methods of wave mathematics and acoustics to the study of different technical phenomena.

LEARNING APPRAISAL SYSTEM

Ordinary Call:
- Theoretical-practical written exams (70%). Partial exams will be held, grouped by topic, whenever possible, during the semester to evaluate the learning of the contents presented in the theoretical and problem classes. Face-to-face exams are free for the final exam as long as the average score is equal to or greater than 5 points out of 10 and you get at least a 4 in each of them (or 40%, if you don't evaluate it out of 10). If this grade is not passed, in the final exam the student will be examined for all the theoretical and/or practical contents that are suspended, and must obtain at least 4 (or 40%, if not evaluated out of 10) in each of those parts not previously approved. To successfully pass the subject, you must obtain at least a grade of 5 out of 10 in this part.
- Papers and/or oral presentations (20%). Its content and conditions of presentation will be shown in each work that is requested.
To pass the course, the average number of papers and/or oral presentations must be equal to or greater than 4.
- Participation in the development of classes, attendance and work (10%): In this part of the qualification there is no recovery or minimum grade.
To successfully pass the course, a minimum of 5 points out of 10 must be achieved, once all the parts have been added together.
The continuous evaluation will be lost with an attendance of less than 80%, so in this case you must complete the ordinary call exam (70%) and submit the papers and/or internships requested throughout the course (20%).
Extraordinary Call:
a) Written or oral, developmental, short answer or test-type tests: 80%
To pass the course, it is necessary to obtain a grade equal to or greater than 5 in this part.
b) Daily activities, work and individual and group exercises. Continuous evaluation and assistance: This form of evaluation will not be recoverable in the extraordinary.
c) Evaluation of activities carried out in the laboratory: 20%.
To pass the course, the average number of papers and/or oral presentations must be equal to or greater than 4.
To pass the course, the weighted average of all parts must be equal to or greater than 5.
Academic waiver:
Those students with an academic exemption will be evaluated by the same type of tests. 10% of class participation can be obtained by attending at least 3 tutorials with the subject teacher.
In general:
Works delivered after the deadline for delivery will not be corrected.
For any exam, whether for the extraordinary call, it is required to be carried out with a dark blue or black pen, never in pencil, since the answer made with this last material would be invalidated.
For any call, the qualification criteria for an exam exercise will always be 50% associated with the appropriate approach from a physical point of view and the other 50% with the mathematical resolution of the same.
It is also required to include brief explanations, indicating what is being done and why. The answers must be

justified.
In any work or activity or evaluable test, an oral defense may be requested, whose grade will prevail over rubrics or other grading systems.
Any type of fraud or plagiarism on the part of the student in an evaluable activity will be sanctioned as set out in the UFV Coexistence Regulations. For these purposes, any attempt to defraud the evaluation system, such as copying exercises, exams, practices, works or any other type of delivery, either from another colleague, or from unauthorized materials or devices, in order to make the teacher believe that they are his own, will be considered 'plagiarism'.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Alejandro L. Giani Architectural Acoustics Buenos Aires: Editorial Nobuko, [2012]
(Alejandro L. Giani Architectural Acoustics Buenos Aires: Editorial Nobuko, [2012] , ||Jaime Llinares Galiana, Ana Llopis Reyna, Francisco Javier Sancho Vendrell Architectural and Urban Acoustics Editorial Universidad Politécnica de Valencia, 2011.)

Additional

Tipler, Paul Allen. Fly, Gene. Physics for Science and Technology. 6th ed. Barcelona:Reverté, 2016.