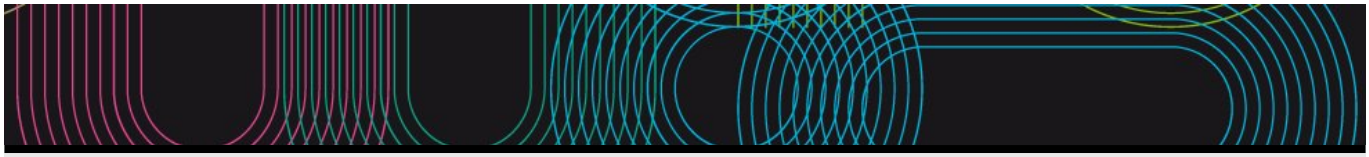

IDENTIFYING DATA				
Professional Software in Acoustics				
Subject	Professional Software in Acoustics			
Code	V05M135V01215			
Study programme	(*)Máster Universitario en Matemática Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	Sobreira Seoane, Manuel Ángel			
Lecturers	Cutanda Henríquez, Vicente Santamarina Ríos, Duarte Sobreira Seoane, Manuel Ángel			
E-mail	msobre@gts.uvigo.es			
Web	http://www.m2i.es/docs/modulos/SoftwareAcustica.pdf			
General description	(*)Pretendese que o estudante se familiarice cos distintos paquetes de software para a simulación e resolución numérica de problemas acústicos, intentando que se manteña un paralelismo entre este curso e el de modelización acústica.			

Competencies	
Code	
A4	(*)Ser capaz de seleccionar un conjunto de técnicas numéricas, lenguajes y herramientas informáticas, adecuadas para resolver un modelo matemático.
A5	(*)Ser capaz de validar e interpretar los resultados obtenidos, comparando con visualizaciones, medidas experimentales y/o requisitos funcionales del correspondiente sistema físico/de ingeniería.
A8	(*)Conocer, saber seleccionar y saber manejar las herramientas de software profesional (tanto comercial como libre) más adecuadas para la simulación de procesos en el sector industrial y empresarial.
A9	(*)Saber adaptar, modificar e implementar herramientas de software de simulación numérica.
B1	(*)Poseer conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación, sabiendo traducir necesidades industriales en términos de proyectos de I+D+i en el campo de la Matemática Industrial
B4	(*)Saber comunicar las conclusiones, junto con los conocimientos y razones últimas que las sustentan, a públicos especializados y no especializados de un modo claro y sin ambigüedades

Learning aims		
Expected results from this subject	Typology	Training and Learning Results

Basic:	know	A4
CG2: Be able to apply the acquired knowledge and abilities to solve problems in new or unfamiliar environments within broader contexts, including the ability to integrate multidisciplinary R & D in the business environment;	Know How	A5 A8 A9
CG4: To have the ability to communicate the findings to specialist and non-specialist audiences in a clear and unambiguous way.		B1 B4
CG5: To have the appropriate learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous, and also to be able to successfully undertake doctoral studies.		
Specific:		
CE4: Being able to select a set of numerical techniques, languages and tools, appropriate to solve a mathematical model.		
Numerical Simulation specialization:		
CS2: To adapt, modify and implement software tools for numerical simulation.		

Contents

Topic	
1- Equations, Analytical Solutions and Numerical Methods for the Acoustic Equations in one dimension.	1.1 Review of the Wave Equations in one Dimension. 1.2 Porous Means Equations. 1.3 Multilayer Acoustic Transmission. 1.4 Numerical Methods. Dispersion and Pollution Error. 1.5 Simulation in Matlab and use of the Programme PAMM.
2- Acoustic Equations in Two and Three Dimension.	2.1 Resolution Methods for the Fluid in rigid cavity. Numerical Calculus of the Resonance Frequencies. 2.2 Resolution Methods for the transient acoustics equation. 2.3 Use of the Programm COMSOL.
3- Application of the Acoustic Boundary Element Method.	3.1 Basic Theory. Helmholtz Integral Equation. 3.2 BEM in Problems 2D and 3D. 3.3 Formulation for Symmetric Axis Problems. 3.4 The Numerical Implementation of the BEM. 3.5 Description of the Package OPENBEM of MATLAB. 3.6 Problems 2D: Diffraction on Noise Barriers. 3.7 Symmetric Axis Problems: Diffraction on a Sphere and Radiation of a Pulsating Sphere. 3.8 Problems of 3D: Radiation of a Piston on a Sphere. Radiation of Cabinet Loudspeakers.

Planning

	Class hours	Hours outside the classroom	Total hours
Classroom work	24	24	48
Tutored works	0	57	57
Master Session	15	30	45

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

Methodologies

	Description
Classroom work	Development of basic practical cases, guided by the teacher to learn the fundamentals of the software.
Tutored works	Practical works on the application of the software and numerical methods in acoustic problems.
Master Session	Brief masterclasses at the beggining of each session, covering the fundamental aspects of the methods and the software to apply in each case.

Personalized attention

Methodologies	Description
Tutored works	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions. Tutoring sessions could be virtual (through skype or similar). Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.

Assessment

	Description	Qualification
Tutored works	Assesment will be carried out through the resolution of practical works.	100

Other comments on the Evaluation

Sources of information

D.T. Blackstock., **Fundamentals of Physical Acoustics**,

G.C. Cohen., **Higher-order numerical methods for transient wave equations.**,

COMSOL Acoustics module. User□s Guide and Model Library.,

- F. Ihlenburg., **Finite Element Analysis of Acoustic Scattering.**,

Peter M. Juhl, **The Boundaty Element Method for Sound Field Calculations**,

Recommendations

Subjects that it is recommended to have taken before

(*)Acústica/V05M135V01204