UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2020/21
Subject (*)	Professional software in finance		Code	614855218
Study programme	Mestrado Universitario en Matemática Industrial (2013)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Departamento profesorado másterMatemáticas			
Coordinador	Vazquez Cendon, Carlos	E-mail	carlos.vazquez.cendon@udc.es	
Lecturers	Calvo Garrido, María Del Carmen Fernandez Veiga, María de las Mercedes Vazquez Cendon, Carlos	E-mail	carmen.calvo.garrido@udc.es carlos.vazquez.cendon@udc.es	
Web	www.m2i.es			
General description	It is intended that the student knows the most used software tools in relation to the contents studied in the subject of models, as well as being able to develop their own software.			
Contingency plan	1. Modifications to the contents: : there are no modifications 2. Methodologies *Teaching methodologies that are maintained: all methodologies are maintained *Teaching methodologies that are modified: there are no modifications 3. Mechanisms for personalized attention to students: Consultation of doubts by email, videoconference system of the master, TEAMS or skype. Available to the student, setting an appointment between the student and the teacher if necessary. 4. Modifications in the evaluation: - Exercises to be solved with Python, which represent 50% of the grade. - Exercises to be solved with MATLAB, which represent 20% of the grade. - Exercises to be solved with Excell, which represent 30% of the grade. *Evaluation observations: The criteria for the 2nd assessment opporunity are the same as in the 1st assessment opportunity. 5. Modifications to the bibliography or webgraphy: there are no modifications			

Study programme competences	
Code	Study programme competences
A1	Alcanzar un conocimiento básico en un área de Ingeniería/Ciencias Aplicadas, como punto de partida para un adecuado modelado matemático, tanto en contextos bien establecidos como en entornos nuevos o poco conocidos dentro de contextos más amplios y multidisciplinares.
A2	Modelar ingredientes específicos y realizar las simplificaciones adecuadas en el modelo que faciliten su tratamiento numérico, manteniendo el grado de precisión, de acuerdo con requisitos previamente establecidos.
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	Saber adaptar, modificar e implementar herramientas de software de simulación numérica.
A9	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.
B1	Saber aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios, incluyendo la capacidad de integrarse en equipos multidisciplinares de I+D+i en el entorno empresarial.
B2	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
B3	Ser capaz de integrar conocimientos para enfrentarse a la formulación de juicios a partir de información que, aun siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos.
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.
B5	Poseer las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo, y poder emprender con éxito estudios de doctorado.

Learning outcomes			
Learning outcomes	Study programme competences		
Having an overview of the existing range of financial software on the market	AC4 AC8	BC1 BR1	
To handle Excel for usage in the efficient resolution of some financial problems studied in the course of models	AC1 AC4 AC5 AC8 AC9	BC1 BC2 BR1	
Knowing some Matlab specific tools for evaluating products and financial situations	AC2 AC4 AC8 AC9	BC1 BC2 BC3 BR1	
Be able to produce original financial software in Matlab programming environment using appropriate financial toolboxes if necessary	AC4 AC5 AC8 AC9	BJ1 BC1 BC2 BC3 BR1	
Be able to develop financial software that requires interaction between Matlab and Excel,also using the tool ExcelLink when suitable	AC4 AC5 AC8 AC9	BJ1 BC1 BC2 BC3 BR1	

Contents	
Topic	Sub-topic
1. An overview of the current proefessional financial software toolboxes	
2. Introduction to Excell with its usage in finance in view	
4. Excel - VBA - Matlab Interaction: Excel Link	
3. Specific Matlab toolboxes for finance	

5. Software development for financial pricing in Excel and Matlab	
6. Software development for financial pricing in Python	
7. Specific financial toolboxes in Python	

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Problem solving	A4 A5 A9 A8 B2 B5 B3	0	22	22
Guest lecture / keynote speech	A1 A2 A4 A5 A9 A8 B2 B5 B1 B4	21	0	21
Supervised projects	A4 A5 A9 A8 B5 B3	0	30	30
Problem solving	A4 A5 A9 A8 B2 B5 B3	4	4	8
ICT practicals	A9 A8 B4	21	42	63
Personalized attention		6	0	6
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Problem solving	The student must solve some of the issues and problems that allow practice using software tools
Guest lecture / keynote speech	The use of software tools (Excel, Matlab, etc) for the solution of models and financial problems will be described, some of them studied in the course of mathematical models in finance
Supervised projects	Works or projects to solve financial problems using various software toolboxes that have been discussed will be posed to the students
Problem solving	Financial valuation issues to be solved by software tools as classroom exercises willl be posed
ICT practicals	Financial xamples to be solved with the computer will be posed and the commands of the different software tools will be trained

Personalized attention	
Methodologies	Description
ICT practicals Problem solving	Additionally to classroom questions, all questions posed by students though e-mail or during personal appointments with the professor will be indiviually assessed

Assessment			
Methodologies	Competencies	Description	Qualification
Supervised projects	A4 A5 A9 A8 B5 B3	Works or project will be posed to students, mainly consisting of solving financial problems by using the Excell (30) and Python (45) software tools that have been presented during lectures	75
Problem solving	A4 A5 A9 A8 B2 B5 B3	Problems about financial pricing by using the described Matlab software toolboxes will be posed to be solved in classroom	25

Assessment comments
The criteria for the 2nd assessment opporunity are the same as in the 1st assessment opportunity.

Sources of information

Basic	- The Math Works Inc. (2005). Financial Derivatives Toolbox User?s Guide . - The Math Works Inc. (2005). Financial Toolbox User?s Guide. - (). http://www.mathworks.com. - Mark Lutz (2013). Learning Python. O'Really - Hans Petter Langtangen (2009). A primer on Scientific Programming with Python. Springer - Yves Hilpisch (2015). Python for finance. Analyze big finncial data. O'Really - Goutham Balaramen, Luigi Ballagio (2019). QuantLib Python Cookbook. - (). http://numpy.org. - (). http://www.scipy.org. - (). http://www.python-excell.org. - (). http://www.quantlib.org. - (). http://matplotlib.org. - (). http://pydata.org.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Numerical methods and programming/614855201 Mathematical modeling in finance/614855211 Stochastic numerical methods/614855226
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.