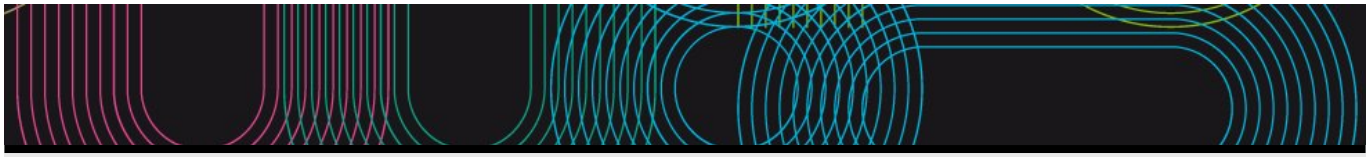
Universidade Vigo

Subject Guide 2017 / 2018



IDENTIFYING DATA				
Economical and Social Networks				
Subject	Economical and Social Networks			
Code	V05M145V01323			
Study programme	Telecommunication Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	2nd	1st
Teaching language	Spanish			
Department				
Coordinator	Fernández Veiga, Manuel			
Lecturers	Fernández Veiga, Manuel			
E-mail	mveiga@det.uvigo.es			
Web	http://faitic.uvigo.es			
General description	Social and Economic networks tackles the dynamic and structural study of networks of relationship between agents that arise in the fields of telecommunications, economy and sociology. We study, in particular, dynamic models of diffusion of information, of contagion, of strategic balance and of training of coalitions. The theoretical contents are applied to a practical study case.			

Competencies	
Code	
A1	CB1 Knowledge and understanding needed to provide a basis or opportunity for being original in developing and/or applying ideas, often within a research context.
A3	CB3 Students must integrate knowledge and handle complexity of formulating judgments based on information that was incomplete or limited, including reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
B4	CG4 Capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
B8	CG8 Ability to apply acquired knowledge and to solve problems in new or unfamiliar environments within broader and multidiscipline contexts, being able to integrate knowledge.
C26	CE26/TE3 Ability to understand and know to exploit the processes of training and dissemination of information in social networks, applying them to the improvement of Internet
C27	CE27/TE4 Ability to design and manage distributed systems based on learning and incentive

Learning outcomes	
Expected results from this subject	Training and Learning Results
Understand the static and dynamic phenomena that explain the structure of the social networks	B4 C26
Know how to analyse the mechanisms of training of networks in strategic terms	B4 B8 C26 C27
Know how to model and apply to real data the processes of diffusion of information in social networks	A1 A3 C26 C27
Know how apply the procedures of structural and dynamic analysis of the networks to analyse complex systems in the technological fields, biological, economic and social.	A1 A3 B4 B8 C26 C27

Know how to use the dynamics of learning in networks to characterise phenomena	A1 A3 B4 C27

Contents

Topic	
1. Basic models	a. Empirical evidence b. Random networks c. Descriptive parameters, centrality and importance d. Scaling laws
2. Training of networks	a. Random models: static training b. Random models: dynamic training c. Strategic training: stability, efficiency and incentives
3. Diffusion and learning in social networks	a. Simple diffusion SIR, SIS and others b. Learning and reinforcement in networks c. Games in networks: strategic complements and strategic substitutes
4. Applications	a. Recommendations/punctuations b. Virality c. Origins of rumours d. Trending topics d. Meritocracy. Identification of experts and leaders

Planning

	Class hours	Hours outside the classroom	Total hours
Projects	14	45	59
Master Session	14	35	49
Troubleshooting and / or exercises	0	11	11
Long answer tests and development	1	2	3
Practical tests, real task execution and / or simulated.	1	2	3

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

Methodologies

	Description
Projects	Development of a practical project of analysis and modeling of a network of diffusion: technological, social, biological or economic. It will consist in the structural and dynamic explanation of the observable phenomena in the data that describe the network. Through this methodology, competencies CB1, CB3, CG4, CG8, CE26 and CE27 are developed.
Master Session	Synthetic exposition in the classroom of the basic concepts that support the subject. Through this methodology, competencies CB1, CB3, CG4, CG8, CE26 and CE27 are developed.

Personalized attention

Methodologies	Description
Master Session	Resolution of doubts, bibliographic recommendations, proposals of exercises or explanation of concepts and technical on any part of the program of the *asignatura. Individual attention to the students.

Assessment

	Description	Qualification	Training and Learning Results		
Troubleshooting and / or exercises	Correction of the exercises proposed. Written submission.	30	A1 A3	B4 B8	C26 C27
Long answer tests and development	Written examination paper.	50	A1 A3	B4 B8	C26 C27
Practical tests, real task execution and / or simulated.	Functional test of the practical project.	20	A1 A3	B4 B8	C26 C27

Other comments on the Evaluation

We leave to discretion of the students two methods of alternative evaluation in the subject: continuous evaluation and single evaluation. The continuous evaluation will consist in the realisation of a written exam (50% of the qualification), a laboratory

project (30%) and in the resolution written of problems along the course (20% of the qualification). The single evaluation will consist in the realisation of a final examination writing (60% of the qualification) and in the development of a practical project (40% of the qualification) that will be due before the last day of the official period of examinations.

The students will choose one or another modality of evaluation in the moment in that the project is announced. They will be considered not presented in case no explicit election is made at in this moment. Those who do not pass the subject at the earliest opportunity of the announcement have of a second opportunity in the month of July in which his knowledge will be tested with a written examination or his project will be assessed again if it had been improved or modified. The weights of each one of the tests (examination and project) will be the same that in the ordinary period of evaluation according to the modality that had chosen.

The qualification of the test has only effects in the academic course in that they were awarded, with independence of the itinerary of evaluation chosen.

Should any form of plagiarism be detected in a project or test, the final grade in the subject will be FAIL (0) and the event will be reported to the academic officers so that appropriate sanctions could be taken.

Sources of information

Basic Bibliography

B. Bollobas, **Random Graphs**, 2ª, Cambridge University Press, 2001

D. Easley, J. Kleinberg, **Networks, Crowds, and Markets: Reasoning About a Highly Connected World**, Cambridge University Press, 2010

Complementary Bibliography

A. D. Barbour, L. Holst and S. Janson, **Poisson Approximation**, 2ª, Oxford Science Publications, 1992

R. Durrett, **Random Graph Dynamics**, Cambridge University Press, 2010

G. Grimmett, **Percolation**, 2ª, Springer, 1999

S. Janson, T. Luczak, A. Rucinski, **Random Graphs**, Wiley, 2000

R. Meester and R. Roy, **Continuum Percolation**, Cambridge University Press, 2008

R. van der Hofstad, **Random graphs and complex networks**, Cambridge University Press, 2016

Recommendations