

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	社交网络模型及应用 Social Network Models and Applications
2.	<b>授课院系 Originating Department</b>	信息系统与管理工程系 Department of Information Systems & Management Engineering
3.	<b>课程编号 Course Code</b>	MIS310
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业选修课 Major Elective Courses
6.	<b>授课学期 Semester</b>	秋季 Fall
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation &amp; Contact (For team teaching, please list all instructors)</b>	李崇, 信息系统与管理工程系 Chong Li, Department of Information Systems & Management Engineering, lic6@sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	无 NA
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	32	32			64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 None				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 None				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 None				

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

随着交通和新一代移动应用的发展，人们之间的联系更加紧密，互动更加频繁。社会和经济网络的形成和结构影响信息如何通过网络流动，从而影响人们的行为。网络结构对人的行为的潜在影响，使得研究不同的网络结构对人的行为有何不同的影响，哪种形式的网络结构更容易出现，以及如何根据需要有效地优化网络结构变得至关重要。本课程将从图论、博弈论和算法等领域的研究中对这些主题进行概述。

With the development of transportation and new generation of mobile applications, people are better connected and interact with each other more frequently. The formation and structure of social and economic networks affect how information flow through the network and thus affect people's behaviour. The potential impact of network structure on people's behaviour makes it crucial to study how different network structure will impact people's behaviour differently, which form of network structure is more likely to appear, and how to transform the network structure effectively as we need to. This course will provide an overview on these topics drawing perspective from research in areas such as graph theory, game theory, and algorithms.

#### 16. 预达学习成果 Learning Outcomes

本课程从社会和经济网络的一些经验背景开始，并概述用于描述和衡量网络的概念。接下来，我们将介绍一组网络如何形成的模型，包括随机网络模型和战略形成模型。然后我们将讨论网络如何影响行为的一系列模型，包括传染、扩散、学习和同伴效应。最后，我们将介绍一些经验方法，例如图神经网络、图卷积网络，以研究网络结构如何影响结果。

The course begins with some empirical background on social and economic networks, and an overview of concepts used to describe and measure networks. Next, we will cover a set of models of how networks form, including random network models as well as strategic formation models. Then we will discuss a series of models of how networks impact behaviour, including contagion, diffusion, learning and peer influences. Lastly, we will cover some empirical methods such as graph neural networks, graph convolutional networks to study how network structure impact the outcome.

#### 17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

理论和实验课 (64 课时) :  
 导论 (2 课时)  
 网络的表示和衡量 (4 课时)  
 社交网络和经济网络的实证背景 (4 课时)  
 基于随机图模型的网络(4 课时)  
 网络的表示和衡量习题课 (2 课时)  
 随机网络的生长(4 课时)  
 随机图模型习题课 (2 课时)  
 策略性的网络生长(4 课时)  
 网络扩散模型(4 课时)  
 网络生长习题课 (2 课时)  
 基于网络的学习(4 课时)  
 网络扩散习题课 (2 课时)  
 网络上的决策, 行为和博弈(4 课时)  
 基于网络学习的习题课 (2 课时)  
 通过网络连接的市场 (4 课时)  
 网络上决策, 行为和博弈的习题课 (2 课时)  
 基于博弈论的网络形成建模(4 课时)  
 社交互动的观察和衡量 (2 课时)  
 文献选读 1 (4 学时)  
 文献选读 2 (4 学时)

Lectures and Tutorial (64 credit hours)

1. Introduction (2 credit hours)
2. Representation and Measurement of Networks (4 credit hours)
3. Empirical Background on Social Networks and Economic Networks (4 credit hours)
4. Network based on random graph model (4 credit hours)
5. Network Representation and Measurement Exercises (2 credit hours)
6. Growth of Random Networks (4 credit hours)
7. Random graph model exercises (2 credit hours)
8. Strategic Network Growth (4 credit hours)
9. Network Diffusion Model (4 credit hours)
10. Network growth exercises (2 credit hours)
11. Web-based learning (4 credit hours)
12. Network Diffusion Exercises (2 credit hours)
13. Decision-making, Behaviour and Gaming on the Internet (4 credit hours)
14. Exercises based on web-based learning (2 credit hours)
15. Market Connected via Internet (4 credit hours)
16. Exercises on decision-making, behaviour and games on the Internet (2 credit hours)
17. Network formation modelling based on game theory (4 credit hours)
18. Observation and Measurement of Social Interactions (2 credit hours)
19. Selected Readings 1 (4 credit hours)
20. Selected Readings 2 (4 credit hours)

18. 教材及其它参考资料 **Textbook and Supplementary Readings**

Matthew O. Jackson, Social and Economic Networks, Princeton University Press

David Easley, and Jon Kleinberg. Networks, crowds, and markets. Vol. 8. Cambridge: Cambridge university press, 2010

William L Hamilton. Graph representation learning

**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		40		
期中考试 Mid-Term Test		30		
期末考试 Final Exam		30		
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				

Southern University  
of Science and  
Technology

20. 记分方式 GRADING SYSTEM

A. 十三级等级制 Letter Grading  
 B. 二级记分制（通过/不通过） Pass/Fail Grading

**课程审批 REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过  
This Course has been approved by the following person or committee of authority