THE UNIVERSITY OF HONG KONG
HKU Business School

ECON2217 Economics of Networks
Semester 1, 2021-2022

GENERAL INFORMATION

Instructor: Stephen Ching
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Consultation times: 16:30-17:20 (Tuesday) and 13:30-14:20 (Friday)

Lecture: 14:30-17:20 (Tuesday) at MBG07

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Pre-requisites: ECON1001/1210 Introductory Microeconomics

Course Website: https://moodle.hku.hk/course/view.php?id=86363

COURSE DESCRIPTION

The world has become more and more connected since the appearance of the modern Internet in the early 1990s. The Internet allows individuals be connected in many different ways. Graph theory can help us (1) evaluate whether "the world is getting smaller", (2) understand "the strength of weak ties", and (3) relate evolution of networks to the concept of "balanced networks".

More important applications involve both graph theory and game theory. For instance, graph theory can be used to identify "constricted sets" to be the only obstacle of obtaining a perfect solution of a matching problem. Game theory (auction theory in particular) is used to demonstrate how to formulate a matching problem as a matching market and devise a general method of removing the obstacle of "constricted sets".

Another example is that while graph theory provides a general understanding of the concept of power in a network, game theory (Nash bargaining solution in particular) is used to quantify the powers of different individuals in a network. Network exchange theory experiments are introduced to further enhance the understanding of the concept of power.

Graph theory can also help us understand link analysis and Web search. Building on this, game theory is used to provide an analysis of how sponsored search markets work.

COURSE OBJECTIVES

1. To provide an introduction of graph theory and game theory

2. To provide a systematic analysis of network structure based on graph theory

3. To provide an explanation of behavior in networks with different structures based on game theory and graph theory

FACULTY LEARNING GOALS (FLGs)

FLG1: Acquisition and internalization of knowledge of the programme discipline
FLG2: Application and integration of knowledge
FLG3: Inculcating professionalism
FLG4: Developing global outlook
FLG5: Mastering communication skills
FLG6: Cultivating leadership

COURSE LEARNING OUTCOMES	
Course Learning Outcomes	**Aligned Faculty Goals***

CLO1. Master basic graph theory and game theory	Goals 1, 2
CLO2. Master a systematic analysis of network structures based on graph theory	Goal 2
CLO3. Apply game theory and graph theory to economic problems in different networks	Goals 2, 4

* Faculty Goal 1: Acquisition and internalization of knowledge of the programme discipline; Goal 2: Application and integration of knowledge; Goal 4: Developing global outlook

COURSE TEACHING AND LEARNING ACTIVITIES

Course Teaching and Learning Activities	Expected contact hour	Study Load (% of study)
T&L1. Lecture	36 hours	30%
T&L2. Tutorial	12 hours	10%
T&L3. Coursework	48 hours	40%
T&L4. Self study	24 hours	20%
Total	120 hours	100%

Assessment Methods	Brief Description	Weight	Aligned Course Learning Outcomes
A1. Tutorial Assignments	Consolidate your knowledge in tutorials; complete and submit **five** tutorial assignments to keep up with the progress of the course	25%	CLO1, CLO2
A2. Essays	Write **three** essays to demonstrate your understanding of specific topics covered in the course (**students who submit less than two essays will receive an F grade in the course**)	30%	CLO1, CLO2, CLO3
A3. Individual Term Paper	Come up with your own topic and write an application of both graph theory and game theory covered in the course (**students who do not submit the term paper will receive an F grade in the course)**	45%	CLO1, CLO2, CLO3
Total		100%	

STANDARDS FOR ASSESSMENT

Course Grade Descriptors

A+, A, A-	Strong evidence of superb ability to fulfill the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize
B+, B, B-	Strong evidence of the ability to fulfill the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize
C+, C, C-	Evidence of adequate ability to fulfill the intended learning outcomes of the course at low levels of learning such as describe and apply but not at high levels of learning such as evaluate, and synthesize
D+, D	Evidence of basic familiarity with the subject
F	Little evidence of basic familiarity with the subject

Assessment Rubrics for Assignments, Essays, and Individual Term Paper are the same as in the Course Grade Descriptors.

COURSE CONTENT AND TENTATIVE TEACHING SCHEDULE		
Week	**Course Content**	**Textbook**
Part I Graph Theory and Game Theory		
1-2	Graph Theory	Chapters 2-3, 5
3-4	Game Theory	Chapters 6, 8-9
Part II Extensions		
5-6	Markets and Strategic Interaction in Networks	Chapters 10, 12
Reading Week		
7-9	Information Networks	Chapters 13-15
10-12	Network Dynamics: Population Effects	Chapters 16-18
Textbook		
David Easley and Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World, Cambridge University Press, 2010 (https://www.cs.cornell.edu/home/kleinber/networks-book/)		

MEANS/PROCESSES FOR STUDENT FEEDBACK ON COURSE
1. Direct response via lectures, tutorials, and consultation times 2. Online response via email and Moodle site

COURSE POLICY (e.g. plagiarism, academic honesty, attendance, etc.)

The University Regulations on academic dishonesty will be strictly enforced! Please check the University Statement on plagiarism on the web: http://www.hku.hk/plagiarism/.

Academic dishonesty is behavior in which a deliberately fraudulent misrepresentation is employed in an attempt to gain undeserved intellectual credit, either for oneself or for another. It includes, but is not necessarily limited to, the following types of cases:

a. Plagiarism - The representation of someone else's ideas as if they are one's own. Where the arguments, data, designs, etc., of someone else are being used in a paper, report, oral presentation, or similar academic project, this fact must be made explicitly clear by citing the appropriate references. The references must fully indicate the extent to which any parts of the project are not one's own work. Paraphrasing of someone else's ideas is still using someone else's ideas, and must be **acknowledged**.

b. Unauthorized Collaboration on Out-of-Class Projects - The representation of work as solely one's own when in fact it is the result of a joint effort. Where a candidate for a degree or other award uses the work of another person or persons without due acknowledgement.

1. The relevant Board of Examiners may impose a penalty in relation to the seriousness of the offence.
2. The relevant Board of Examiners may report the candidate to the Senate, where there is *prima facie* evidence of an intention to deceive and where sanctions beyond those in (1) might be invoked.