Engineering Tripos Part IIA Project, SF5: Networks, friendship, and disease, 2023-24

Leader

[Dr G Cantwell](#) [1]

Timing and Structure

Friday 11-1, Tuesday 9-11 plus afternoon

Aims

The aims of the course are to:

- To understand and apply concepts from the study of networks.
- Familiarity with the basics of discrete maths and graph theory.
- To run simulations of social networks and to link ideas from probability theory to these simulations.
- To implement graph algorithms and appreciate the need for computational efficiency.

Content

Networks can represent the structure of many different things, from technological networks to social networks to biological networks. This project introduces the field of network science. Students will learn about the mathematics that underpins the study of networks. They will explore how ideas from probability theory and stochastic processes can be applied to understand the structure of friendships. They will write software to simulate disease spreading in a network. Finally, the results from different simulations will be explored to establish mathematical insight about the relationship between network structure and spreading processes.

Week 1

Mathematics of networks.

Week 2

Heterogeneity and the friendship paradox.

Week 3

Simulating spreading processes in networks.

Week 4

Linking heterogeneity with the spread of disease.

Coursework

Coursework	Due date	Marks
Interim report 1		15
Interim report 2		15
Final report	4pm, Friday 7 June 2024	50

Examination Guidelines

Please refer to Form & conduct of the examinations [2].

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Links
[1] mailto:gtc31@cam.ac.uk
[2] https://teaching.eng.cam.ac.uk/content/form-conduct-examinations