

Professor Fine
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MTH465 Syllabus

Fall 2024

Nexus: Small Worlds & the Groundbreaking Science of Networks

M. Buchanan

Mathematica or equivalent mathematics-programming software

Week of 9/2:

Labor Day (*No class Tuesday*)

Introduction

Small worlds & networks

Week of 9/9:

Graphs & their computer representations

Add/Drop/Audit deadline is Wednesday

Density, diameter & clustering

Week of 9/6:

Random graphs (Erdős & Rényi)

Week of 9/23:

Generation & properties of random graphs

Week of 9/30

Mathematical certainties about random graphs

Week of 10/7:

Midterm exam

More on random graphs

Pass/Fail deadline is Wednesday

Week of 10/14:

Indigenous People's Day (*Class does meet on Tuesday*)

Social networks & and power companies

Granovetter, Strogatz & Watts

Week of 10/21:

Generation & properties of Strogatz-Watts networks

Week of 10/28:

Mental Health Day (*No class Tuesday*)

The Internet & the web

Power law distributions of vertex degrees

Week of 11/4:

Generation & properties of Barabási-Albert networks

Paper proposal due Thursday

Week of 11/11:

Veterans Day *Monday*

Aiello-Chung-Lu models

Mathematical results

Paper introduction due Thursday

Withdrawal deadline is Friday

Week of 11/18:

More mathematical results

Week of 11/25:

Paper draft due Tuesday

Related topics & Student presentations

Thanksgiving

Week of 12/2:

Student presentations

Week of 12/9:

Paper due Tuesday

Last class is Tuesday

The University Studies 5B learning outcomes are that upon completion of this requirement, students will be able to:

- Identify the needs and resources of the communities to which they belong.
- Apply knowledge and skills gained through academic study to real problems and/or opportunities within their communities.
- Describe the connections between learning on campus and the issues and needs of broader academic, professional or civic communities.
- Articulate the value of engagement to other members of their communities. The community may be professional, scholarly, social, cultural, economic or political.

If you are using this course to fulfill the US 5B requirement you must give their presentations to an off-campus audience, generally¹ a math class at a local high school. I will facilitate making the required arrangements with an instructor. If you wish to present to a different audience, please discuss this with me. You will need to make your own arrangements for the presentation.

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