Subject Information Guide

Graph Drawing

February 5-23, 2018

Administration and contact details

Host Department	School of Mathematical and Physical Sciences.
Host Institution	**University of Newcastle**
Name of lecturer	Peter Eades
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Subject details

Handbook entry URL	
Subject homepage URL	
Honours student hand-out URL	
Start date:	**05/02/2018**
End date:	23/02/2018
Contact hours per week:	8
Lecture day and time:	**Monday-Thursday, 10-12**
Description of electronic access arrangements for students (for example, WebCT)	

Subject content

1. Subject content description

This subject is about geometric representations of graphs, and algorithms that take a graph as input and produce a visualization (aka *drawing*) of the graph as output. We discuss the quality of such visualizations of graphs from the human perceptual point of view.

The course discusses both small and large graphs. For small graphs, we examine algorithms that use the concepts of topological graph theory. For large graphs, we examine methods based on minimising energy in physical system, and well as methods based on spectral graph theory.

2. Week-by-week topic overview

Topics covered are

Topic	Hours
Introduction to graph visualization	2
Background graph theory, algorithmics, and complexity	2
Background graph algorithms	1
Readability metrics and human experiment	2
Tree drawing	2
Planar graphs, topological graphs	1
Straight-line planar graph drawing, orthogonal planar graph drawing	4
Planarization and beyond planarity	2
Faithfulness metrics	2
Force-directed graph drawing and multiscale methods	2
Spectral graph theory	2
Spectral graph drawing	2
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3. Assumed prerequisite knowledge and capabilities

Some combinatorial and linear mathematics.

4. Learning outcomes and objectives

After successful completion of this subject, students will

- understand established graph drawing algorithms.
- be able develop graph drawing algorithms
- understand human perception of graph visualizations

5. Learning resources

There are a large number of textbooks and web resources on the background graph theory and algorithmics.

A number of specific papers will be referenced in class, including papers from the following surveys:

- Kaufmann, Michael; Wagner, Dorothea, eds. (2001), Drawing Graphs: Methods and Models, Lecture Notes in Computer Science, 2025, Springer-Verlag, doi:10.1007/3-540-44969-8.
- Tamassia, Roberto, ed. (2014), Handbook of Graph Drawing and Visualization, CRC Press.

6. Assessment

Exam/assignment/classwork breakdown					
Exam	50%	**Assignment**	40%	**Class work**	10%
Assignment due dates		March 1			
Approximate exam date				March 1	

Institution Honours program details

Weight of subject in total honours assessment at host department	1/8
Thesis/subject split at host department	Thesis 3/8; Coursework 5/8
Honours grade ranges at host department:	
H1	85-100
H2a	75-84
H2b	65-74
H3	50-64