

**Faculty of Science Course Syllabus
Department of Mathematics and Statistics
MATH 4330/5330, CSCI 4115
Topics in Graph Theory
Winter 2018**

Instructor(s): Jason I. Brown jason.brown@dal.ca Chase 204

Lectures: TR 13:05 – 14:25 Chase 319

Course Description

This course is intended for math and computer science students. The course covers the theory of graph colourings and chromatic polynomials of graphs.

Course Prerequisites

A passing grade in MATH 3330.03 or CSCI 3110.03 or permission of the instructor.

Course Objectives/Learning Outcomes

This course presents a topic in graph theory (this year the topic is algebraic graph theory).

Objective: "The student will be able to recall salient definitions in graph theory."

Condition: Given a simple statement involving terminology on graphs.

Behaviour: The student will be able to recall and use the definition in a short proof.

Objective: "The student will be able to understand and utilize basic principles in counting graph colourings."

Condition: Given a statement involving counting graph colourings.

Behaviour: The student will be able to provide a proof.

Objective: "The student will be able to convert between various expansions of the chromatic polynomial"

Condition: Given either a graph.

Behaviour: The student will be able to produce the standard, factorial and tree forms of the chromatic polynomial and be able to convert between them.

Objective: "The student will be able to interpret the coefficients of the chromatic polynomial."

Condition: Given a graph.

Behaviour: The students will be able to interpret the coefficients of the chromatic polynomial.

Objective: "The student will be able determine the chromatic equivalence class of a graph."

Condition: Given a graph.

Behaviour: The student will be able to find all graphs with the same chromatic polynomial.

Objective: "The student will be able to understand various polynomials (adjoint, sigma) associated with the chromatic polynomial."

Condition: Given a graph.

Behaviour: The student will be able to calculate the adjoint and sigma polynomials of the graph.

Objective: "The student will learn the theory of the roots of chromatic and related polynomials."

Condition: Given a graph.

Behaviour: The student will be able to understand the theory of the roots of the associated polynomials, and produce relevant proofs, using a background in algebra and analysis.

Course Materials

Textbook: Chromatic Polynomials and Chromaticity of Graphs by F.M. Dong, K.M. Koh and K.L. Teo, World Scientific, New Jersey, 2005.

Course website: The course website is on Brightspace

Course Assessment

Component	Weight (% of final grade)	Date
<i>Assignments</i>	30%	
<i>Midterm exam</i>	40%	Thursday, March 1, 2018
<i>Presentations</i>	25%	

Other course requirements

<i>Class participation</i>	5%
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Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

Course Policies

No late assignments will be accepted. If you miss the midterm or an assignment, you are required to fill out and submit the Student Self-Declaration of Absence form online in Brightspace. In the case of a

missed assignment, the missed assignment or tutorial attendance score will not be included in the average for that component, if a Student Self-Declaration of Absence form is submitted within six (6) days of the missed due date. In the absence of a Self-Declaration of Absence, the missed assignment/tutorial will receive a grade of zero. For a missed midterm, you must contact the instructor at jason.brown@dal.ca on or before the scheduled date of the midterm, and submit a copy of your academic schedule, so that a make-up midterm can be scheduled. If you are unable to attend the make-up midterm, and submit a second Student Self-Declaration of Absence form, the weight of the midterm will be added to the final exam.

All assignments are to be completed independently; no group assignments are allowed.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

Course Policies

No late assignments will be accepted. If you miss an assignment or the midterm exam, a score of 0 will be assigned unless you fill out the Student Self-Declaration of Absence form online in Brightspace. For a missed midterm, you must contact the instructor at jason.brown@dal.ca on the scheduled date of the midterm, along with your schedule so that a make-up midterm can be scheduled. All students who miss the midterm must write the make-up midterm.

All assignments are to be completed independently; no group assignments are allowed.

Course Content

1) Number of Colourings and Its Enumerations

- a) Basic enumeration
- b) Forms of the chromatic polynomial
- c) Graph operations and

2) Chromatic Polynomials

- a) Interpretation of the coefficients
- b) Broken-cycle theorem
- c) Unimodal conjecture

3) Chromatic Equivalence

- a) Definitions and basic results
- b) Chromaticity of families of graphs

4) Related Graph Polynomials (Adjoint, Sigma)

- a) Definitions
- b) Basic results

5) Chromatic Roots

- a) Definitions
 - b) Results (real roots, integral roots, complex roots)
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ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the ***Request for Accommodation*** form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's ***Policy on Intellectual Honesty*** and ***Faculty Discipline Procedures*** is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

"The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members."

The full text of the code can be found here:

http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties	Killam Library Ground floor Rm G28 <i>Bissett Centre for Academic Success</i>	In person: Killam Library Rm G28 By appointment: - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca

