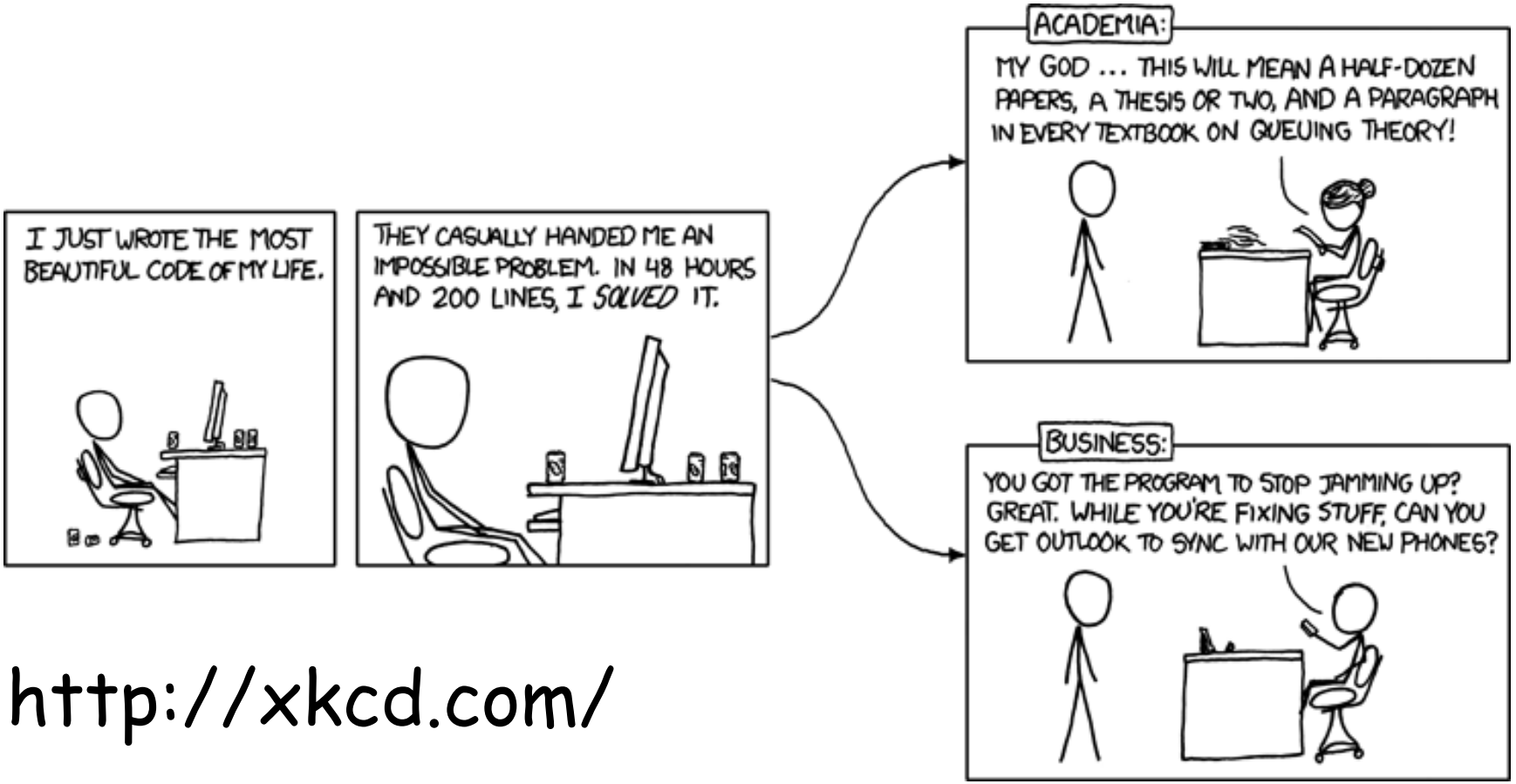
CSC 482B/582B: Fall 2016

Dr. Wendy Myrvold, ECS 552, wendym@cs.uvic.ca



http://xkcd.com/

Natural Sciences and Engineering Research Council of Canada

www.nserc-crsng.gc.ca

Canada Graduate Scholarship – Master's (CGS-M) ($17, 500)

APPLICATION DEADLINE: DEC. 1, 2016

Students must be a Canadian citizen or a permanent resident of Canada.

To qualify for an award from UVic, students must be:

- enrolled in the 1st year of an eligible Master's program; OR,
- have applied for admission to an eligible UVic Master's program admission deadline (January 15 for UVic Computer Science program).

Send me e-mail for more info: wendym@cs.uvic.ca

NSERC Masters INFO– Wed., Oct. 12, 2016 (1pm-3pm)

Cornett Bldg., Room A121 with Dr. Robin Hicks

Natural Sciences and Engineering Research Council of Canada

www.nserc-crsng.gc.ca

NSERC Doctoral Scholarship -- ($21,000 - $35,000)

APPLICATION DEADLINE: OCTOBER 3, 2016

Eligibility:

- be a Canadian citizen or a permanent resident of Canada
- hold, or expect to hold (at the time you take up the award), a degree in science or engineering from a university whose standing is recognized by NSERC
- intend to pursue, in the following year, full-time graduate studies and research at the doctoral level in an eligible program in an NSERC-supported field
- have obtained a first-class average (a grade of "A-") in each of the last two completed years of study (full-time equivalent).

Send me e-mail for more info: wendym@cs.uvic.ca

VERY IMPORTANT:

Grantcrafting & Application Workshop –

Friday, Sept. 9, 2016, (11am-1pm) David Strong Bldg. C116

with Dr. Robin Hicks

Combinatorial Algorithms Group Talk

Classifying Graphs by Degree

Stephen Hedetniemi

3:30pm, Friday September 9, ECS 660

Let G = (V,E) be a connected graph and let v be a vertex in V. The degree of v, deg(v), equals the number of vertices u that are adjacent to v. The type of vertex v is determined by how deg(v) compares with the degrees deg(u) of all vertices u adjacent to v, that is, does v have any neighbors u whose degree is less than, equal to, or greater than the degree of v? Using this measure, there are 7 possible types of vertices. One can then classify any graph by the number of distinct types of vertices it has. We show that there are 71 classes of connected graphs and 46 classes of trees, as measured by the different types of vertices that they contain. We then raise a number of open questions suggested by this classification of graphs.

This is joint work with Jason T. Hedetniemi (Department of Mathematics, St. Anselm College), Sandra M. Hedetniemi (School of Computing, Clemson University), and Thomas M. Lewis (Department of Mathematics, Furman University).

CSC Advising Office (undergrads)

Drop-in appointment times:
Monday, Wednesday, Friday - 10 am - 12 pm
Tuesday, Thursday - 1:30 - 3:30 pm
If you are close to graduating it is a good idea to ensure you have met all the requirements.

New CSC Honours Program Starting Sept. 2016:

Honours Degree in Computer Science with the Software Engineering Option.
Computer Science students who meet the honours criteria can apply for this program as early as September, 2016.

Some course materials will be on connex and you need access to submit assignments. Please make sure NOW that you can login to connex.

https://connex.csc.uvic.ca/portal

On connex there are links to:

Activate your Computer Science Account ***- First year students taking a Computer Science*** *course for the first time and individuals who have been been absent from CSc for an extended period of time (+6 months) must activate their CSc Account.*

Late course registration *- changes to course registration data are processed nightly. If you registered for a course today, please allow overnight for your registration information to be imported into conneX.*

Update Your Email Address: *To fully participate in conneX forums, notifications, and receive assignment notifications from instructors, you must update your preferred email address using the following link: update conneX email address*

Outline for Lecture 1

- Who is the instructor?
- My research interests.
- Logistics for CSC 482A/522- the critical points are included on the course outline and class web pages.
- Don't worry about taking notes today

Class Materials and Announcements

Connex: calendar, electronic assignment/project submissions, feedback on some electronic submissions, links to assignments, model solutions, any class notes using material subject to copyright, and other private class resources, sending e-mail announcements to the class.

Course web pages: assignments, project requirements, projected schedules, class notes (if not private). No password required to access, accessible when connex is down.

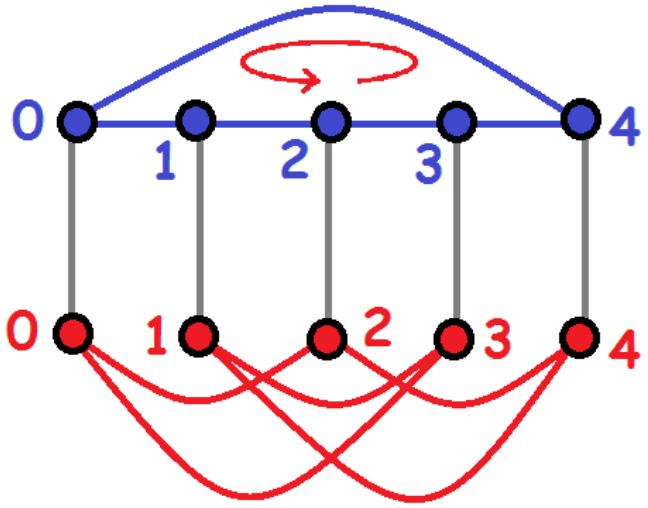
About me:

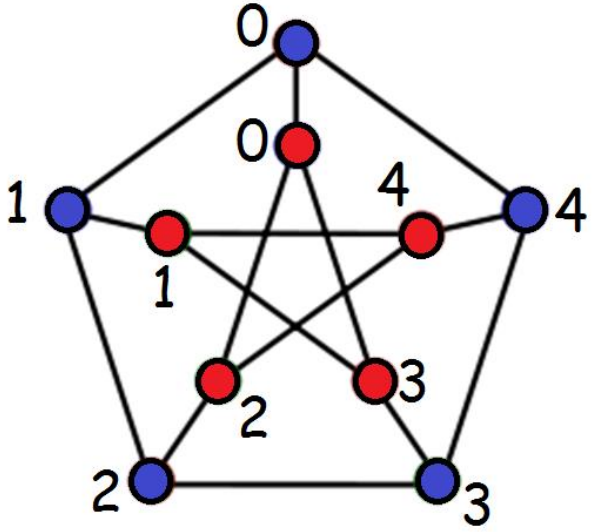
B.Sc. : Computer Science, McGill University, 1983

M.Math. : Combinatorics and Optimization,
University of Waterloo, 1984

Ph.D. in Computer Science: Waterloo, 1988

University of Victoria: started in 1988, currently a full professor.





Jennifer

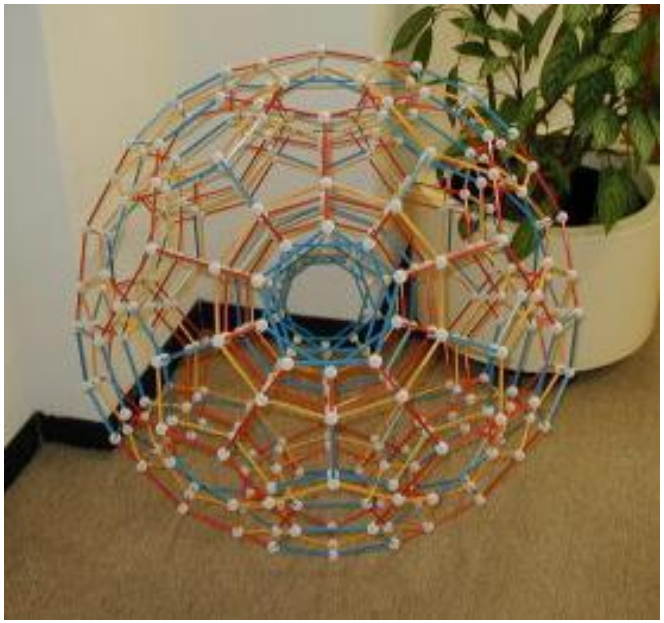
Sean

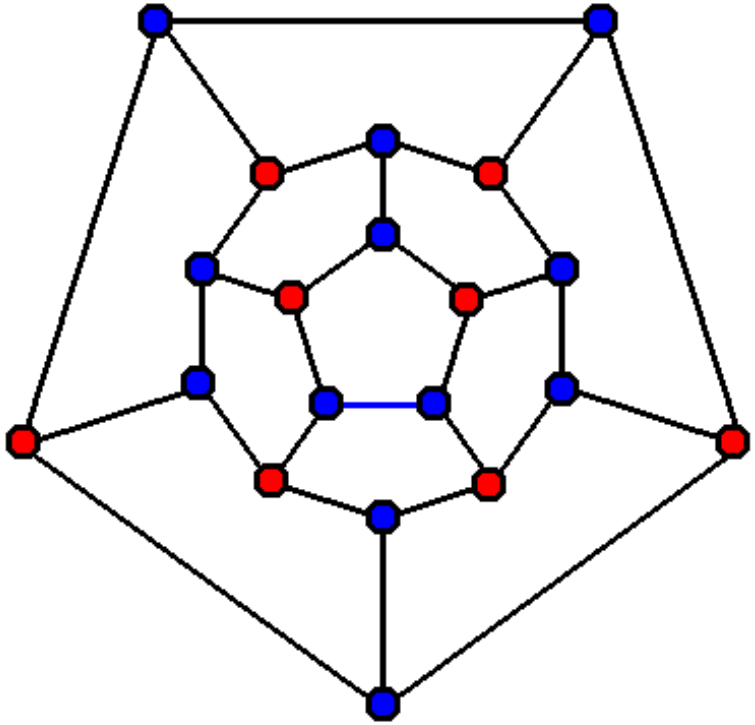

M
CCM

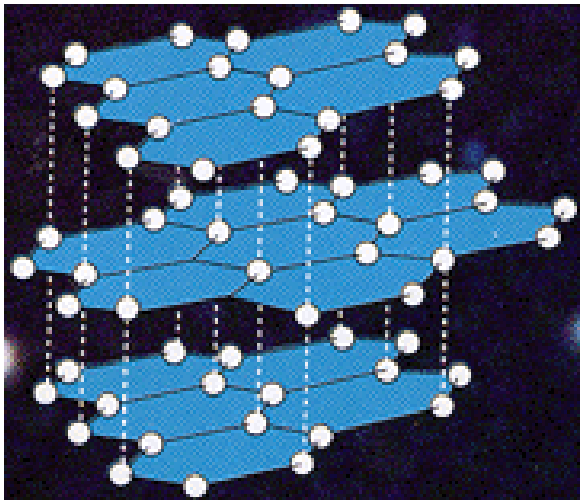
My Research: Large Combinatorial Searches

Independent Set:

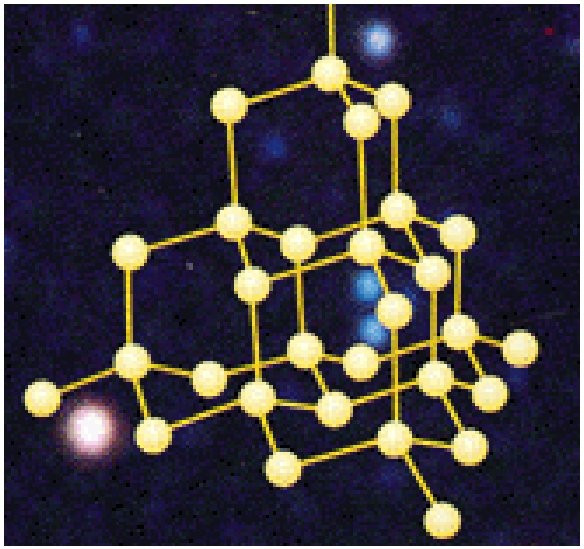
Set of vertices which are pairwise non-adjacent







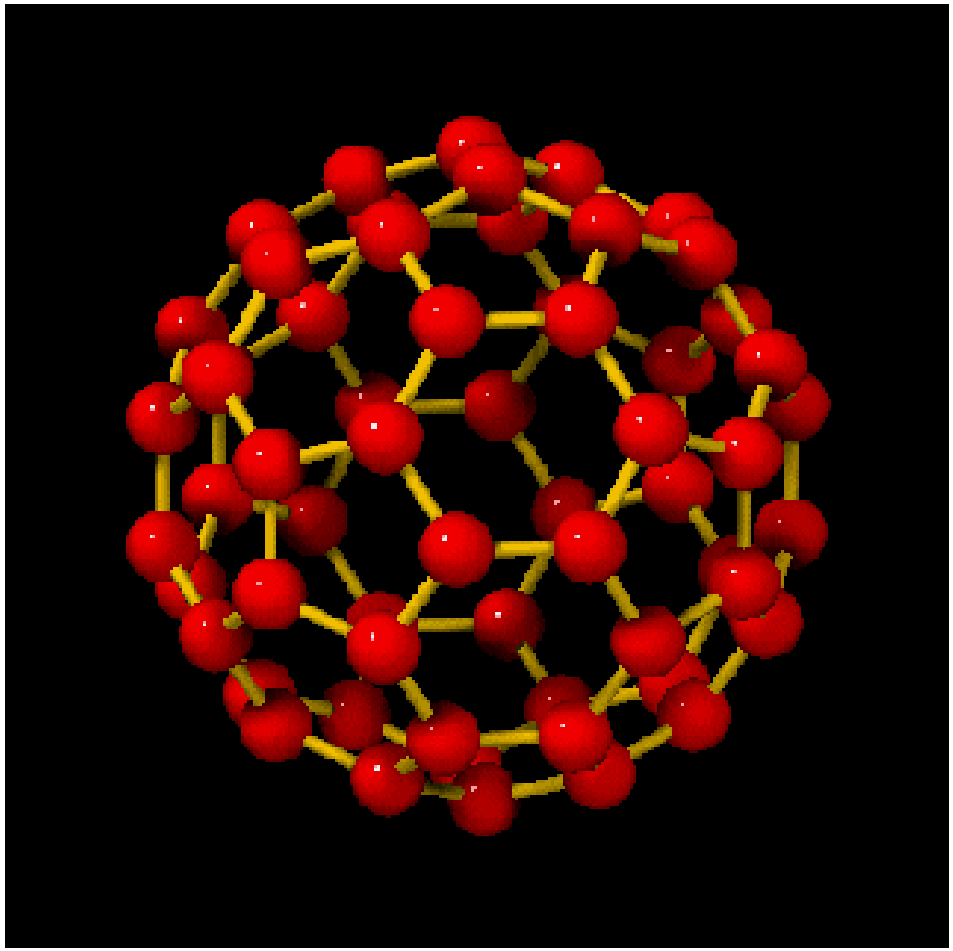
Graphite



Diamond

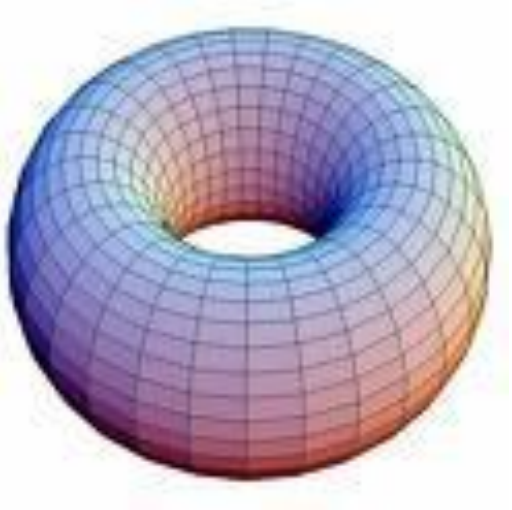
Fullerenes:

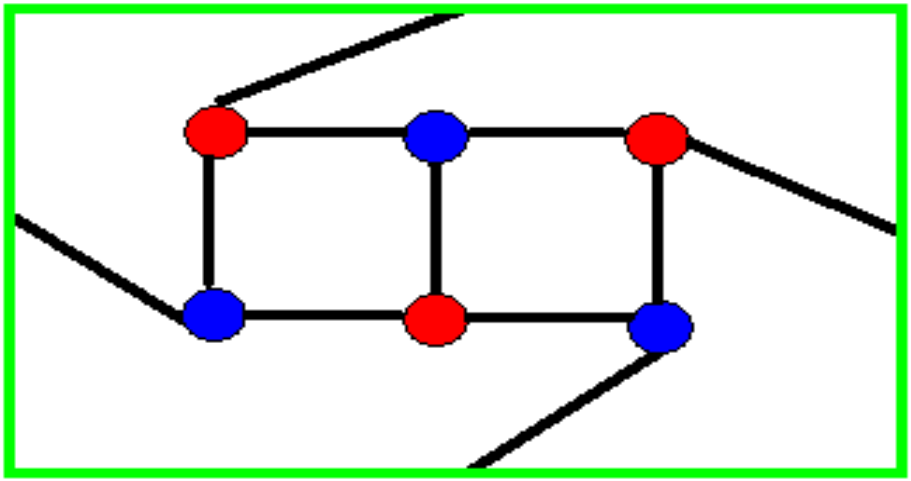
Working with Patrick Fowler (chemist)

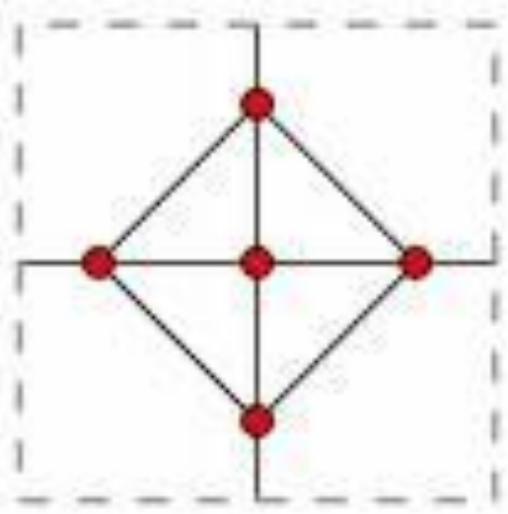


Topological Graph Theory:

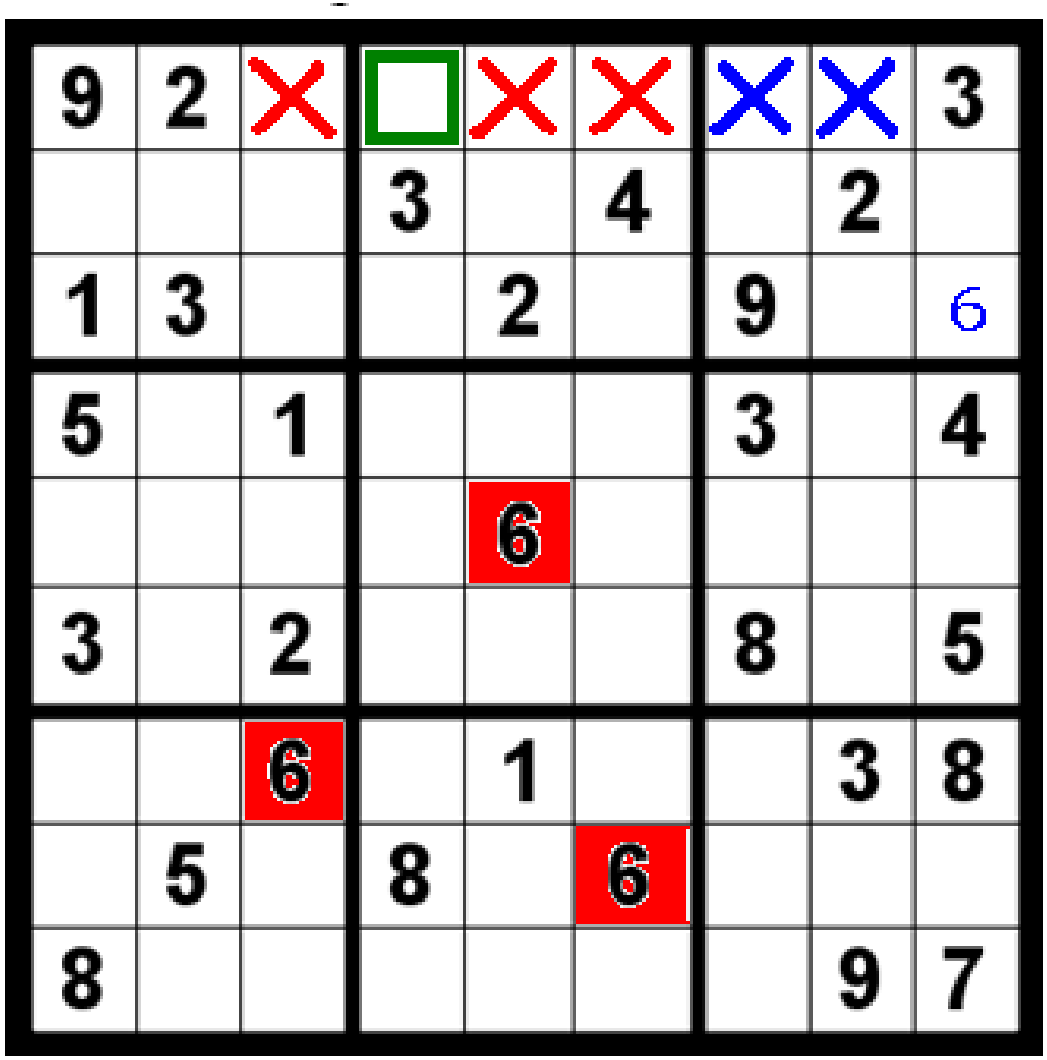
Algorithms and Obstructions





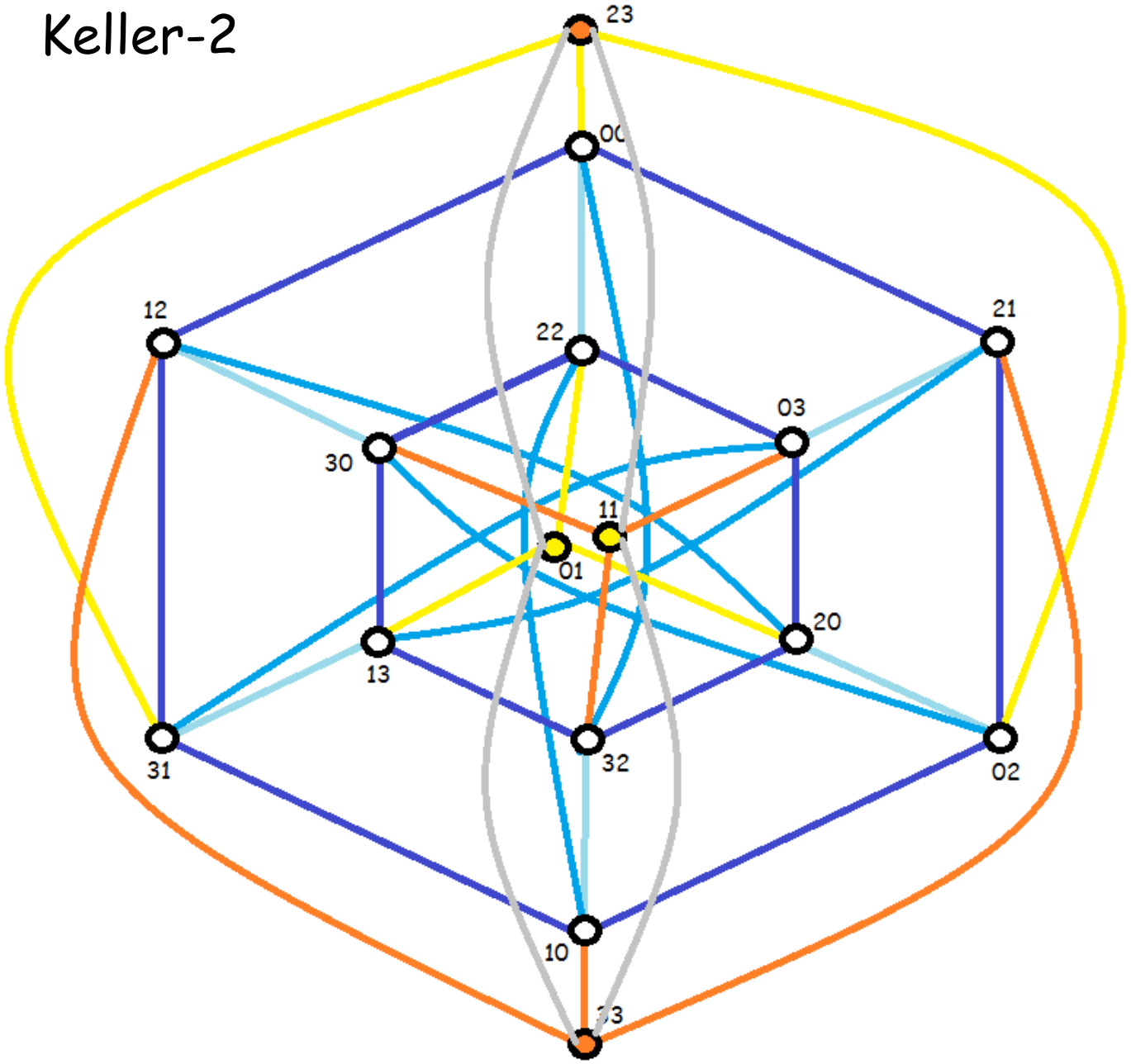


Latin Squares



Please come talk to me if you are looking for Honours project research topics or for an NSERC undergraduate research project.

Keller-2

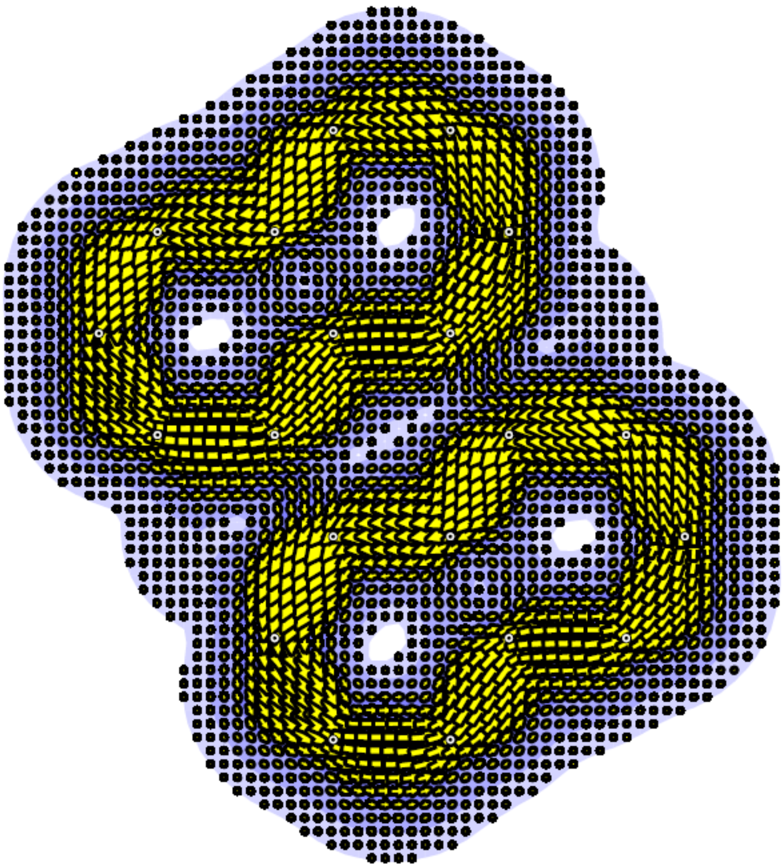


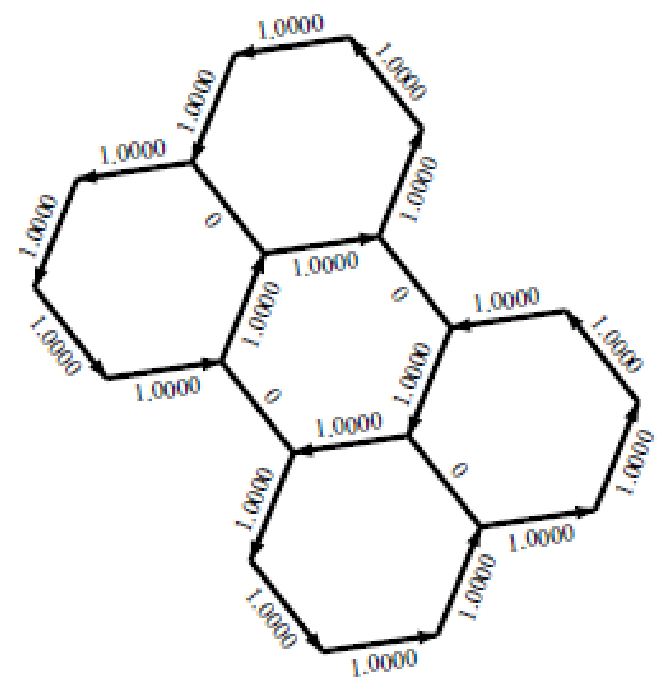
Found the maximum clique order in Keller-7.

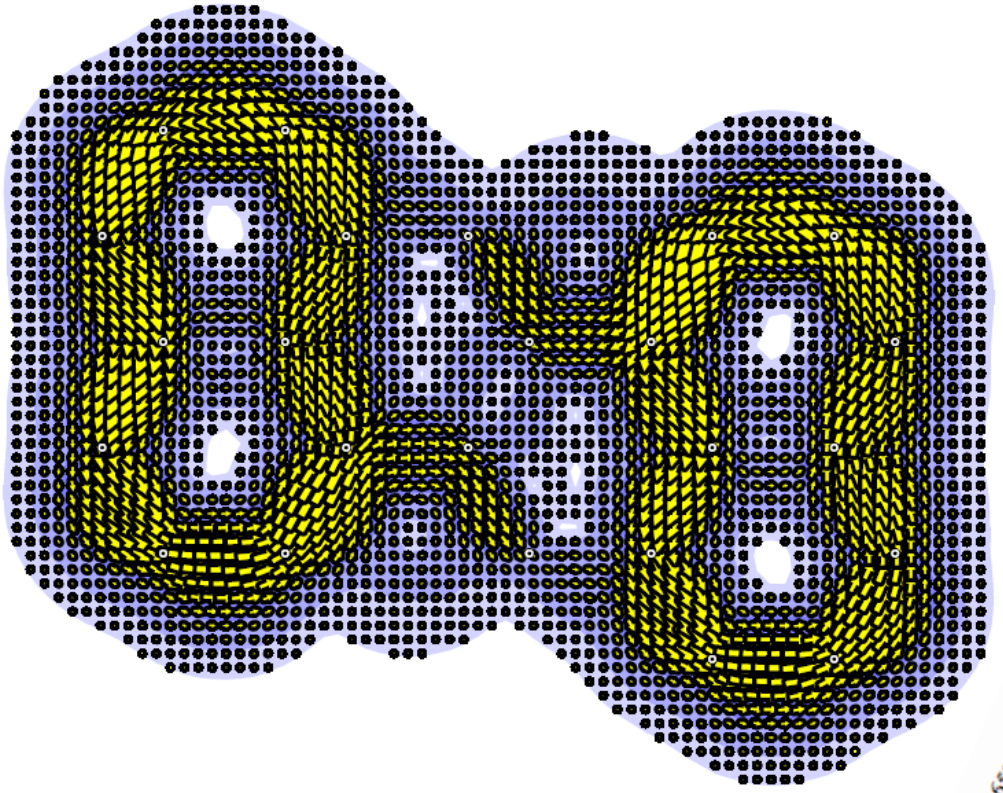
Interested in coloring the complements of Keller-5, Keller-6, and Keller-7.

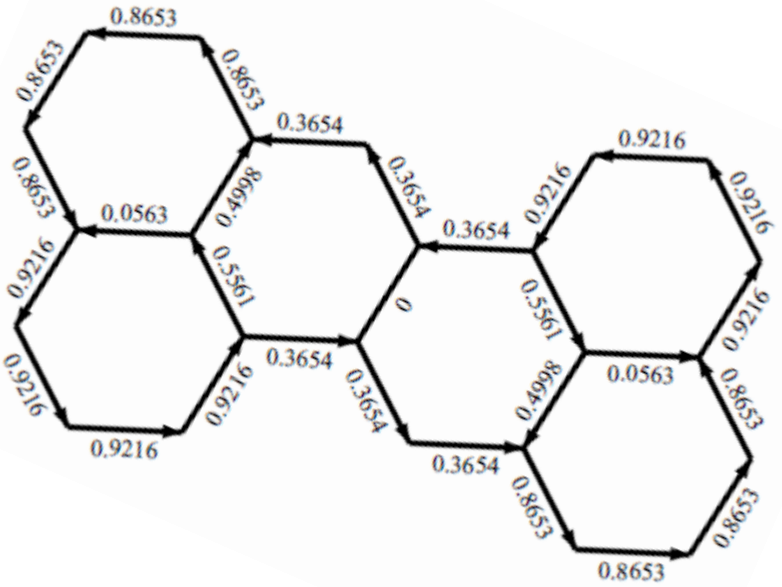
Recent work: currents in benzenoids

Perylene:





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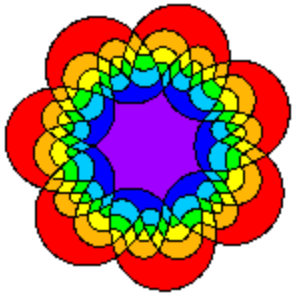
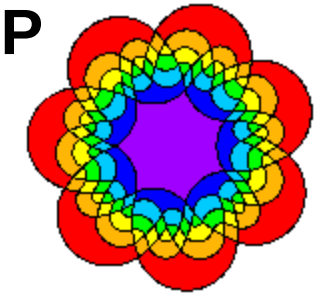


COMBINATORIAL ALGORITHMS GROUP
University of Victoria

http://www.cs.uvic.ca/~wendym/cag



Our research interests include:

Graph Theory and Graph Algorithms
Combinatorics
Combinatorial Algorithms
Computational Geometry
Randomized Algorithms
Computational Complexity
Network Reliability
Topological Graph Theory
Computational Biology
Cryptography
Design Theory

Join our listserv to get information about conferences and research talks.

Undergrads are welcome to all events.

CSC 482B/582B Logistics

Course Website: http://www.cs.uvic.ca/~wendym/425.html

Instructor: Dr. Wendy Myrvold
Email: wendym@cs.uvic.ca

I answer all student e-mails. If you do not get a response in a reasonable time frame please find out why the e-mail did not work.

Office: ECS 552
Phone Number: 472-5783 (use e-mail for a faster response)
Office Hours: TWF 10:45 a.m. - 12:10 p.m.

Please tell me if you plan to come by.

Students with a disability

Please let me know as soon as possible how I can accommodate your disability.

It's often possible to go beyond what is first offered by the disability center.

The aim of this class is to present some research computing skills that can facilitate progress on combinatorial research problems.

The first topic is generating classes of combinatorial objects (such as graphs or Latin squares) including tactics for avoiding repeats of objects that are isomorphic to each other.

Exploring small combinatorial objects can lead to discovery of counterexamples to existing conjectures and can lead to the formulation of new conjectures that are more likely to be correct.

The course also presents approaches for developing practical algorithms for hard problems on combinatorial objects (design theory problems and graphs) including tactics for exploiting symmetry.

Course objectives:

To present the standard definitions for various combinatorial objects including permutations, graphs and Latin squares.

To teach algorithms and algorithm design tactics for:
- generating small combinatorial objects,
- defining and computing a canonical form for a class of objects,
- exploiting symmetry in a problem,
- distributing combinatorial algorithms to multiple machines, and
- estimation of the time taken for large computations.

To introduce students to tactics for doing original research, preparing a talk for a conference, and presentation standards for writing journal papers in this area.

Grading scheme:

Component	CSC 482A	CSC 522
Assignments	50%	40%
Project	50%	60%

This course has NO exams.

Assignments and Project Submissions (except for the final project submission) can be handed in up to 4 days late with a 10% penalty for each day past the deadline.

The final project submission must be handed in on time (exceptions will only be made for valid excuses with appropriate documentation).

Course Mark Appeals

If there has been an error in marking any of your course work, please resubmit your work with a description of the error. Appeals can be done at any time, but you are encouraged to ask for a regrade within 7 days of receiving the marked work.

Research Project

The goal of the project is to provide an opportunity for students to conduct original research. Students can choose from a list of possible project topics.
The projects will all involve both theoretical and programming components.

The submissions for the project include:
- A project proposal worth 5%.
- A research proposal worth 5%.
- Slides for the research proposal worth 5%.

Please see the course web page for up to date deadlines for project submissions. The projected deadlines are:
- Project proposal: due Wednesday Oct. 26.
- Research proposal: due Tuesday Nov. 8.
- Slides for Research proposal: due Tuesday Nov. 22.

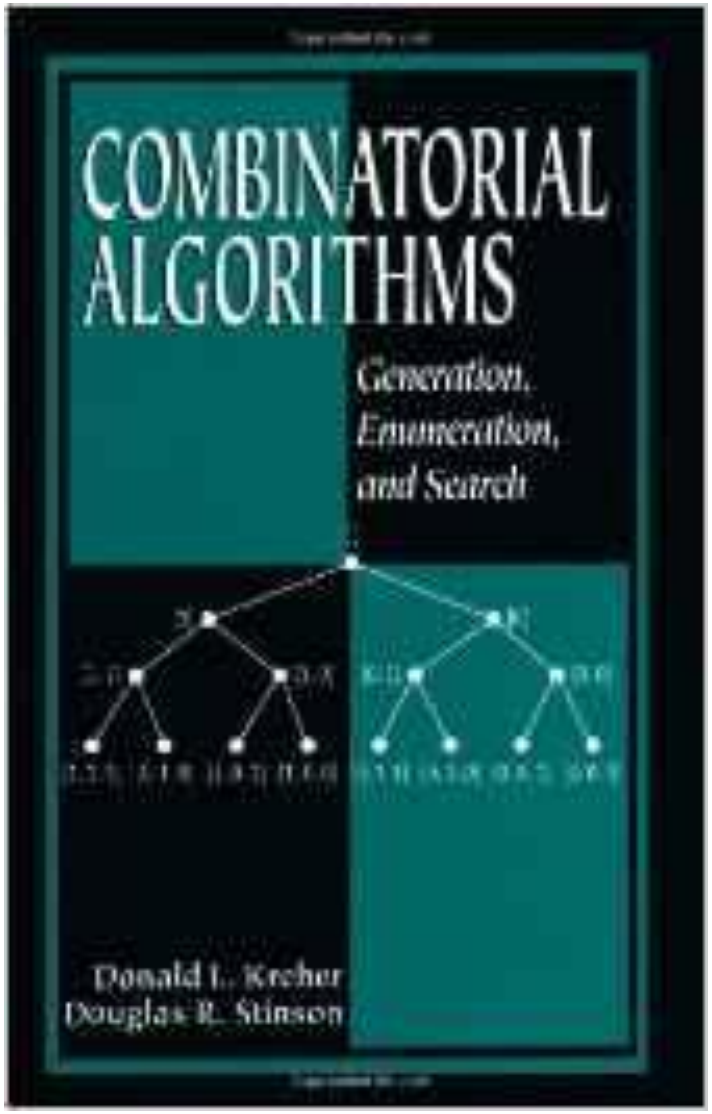
The final project submission will consist of:

- programs and results (worth 15% for CSC 482B and 25% for CSC 582B),
- a written report on the research (worth 10%),
- slides for a presentation of the research (worth 10%).

The final project submission will be due at 12:59 pm on Monday Dec. 15.

There will be higher expectations for the CSC 582B project.

Unfortunately, the class size is too big to allow in-class presentation of the research results.



Don Kreher

Doug Stinson

Text: Combinatorial Algorithms: Generation, Enumeration and Search by Donald L. Kreher and Douglas R. Stinson, CRC Press, 1998.

Other references will be provided if we deviate from the text.

Project Proposal

(1-2 pages) The student should have chosen a project topic by this point. A short report should be turned in describing the problem the student has chosen to study. I want you to define ALL relevant terminology for your project starting from the definitions of a graph, a vertex and an edge. You do not need to include any literature review or progress on the research at this stage- just the problem defintion.

Research Proposal

(3-5 more pages) The student at this point should have collected references related to the problem chosen. This report should describe briefly what has been done on the problem, what the student hopes to accomplish, and should suggest some possible techniques for achieving these goals.

Research Proposal Slides

(3-5 slides) These slides are for a short talk on the material in the written research proposal.

Project

(10-20 pages which includes previous components)

A written report summarizing the outcome of the research proposal. If the research has not been fruitful, then the student should try to explain why the techniques used did not work. The report must include a description of what has not yet been done and a list of related questions for future research. If appropriate, computer code should also be submitted.

Oral Report on Project
(15 minutes, about 15 slides)

The student should prepare an oral presentation of the project. Be sure to include suggestions of interesting problems for future research.

Research:
Students are encouraged to come see the professor to ask questions about their research projects, and to get mentorship and guidance for their research.
Collaborations with other researchers or students is not permitted.

The components for a good research proposal are taken directly from the NSERC guidelines:

1. The Problem: Clearly define the problem. Make sure you are precise and technically accurate with your definitions.

2. Previous Work: Describe how this research fits within the context of what is currently happening in the field. Summarize relevant prior work in the field. Find the 10 most relevant papers on the topic. Some of these should be in journals.

3. Goals: What are the goals of this research?. Include both short term goals (those which you could easily accomplish as part of the course project) and also long term goals (which may be too difficult to accomplish within the short term).

4. Research Plan: Decribe your research plan. Make sure you also describe your methodology- that is, what steps will you follow to make progress on this problem. In particular, what will you do to get started? You should have some idea as to how to proceed beyond the first steps, but it is fine if this is not as concrete as your plan for starting the research.

5. Importance: How will the planned research make a novel contribution to the field? How is this work useful and important?

Project topics will be presented part-way through the term after relevant background material has been taught.

Due to the class size, students are required to choose from my list of selected topics.