Syllabus for Mathematics 1600
Spectrum of Mathematics, Fall 2009

1 Some Basic Information

- **Instructor** Dr. Dorette Pronk
Chase Building 302
E-mail: pronk@mathstat.dal.ca
Office phone: 494-3732
- **Course Hours** Tuesday and Thursday, 11:35 AM - 12:55 PM
- **Office Hours** Monday and Wednesday 11 AM - 12 PM, and Tuesday 10 - 11 AM or by appointment.
- **Class Room** Chase Building, Rm 319
- **Course Website** www.mathstat.dal.ca/∼pronk/1600
- **Text** *A Concise Introduction to Pure Mathematics*, Second Edition, by Martin Liebeck (Chapman and Hall/CRC, 2006)

2 The Course Material

Although the title of the book indicates that it gives an introduction to *pure* mathematics, we will also consider some topics from applied mathematics in this course. I will provide you with additional reading material for those topics, and I may also add some applications to the material covered in the book.

In addition to studying topics from mathematics, we will also discuss some of the culture and history of mathematics.

In this course you will learn about the diversity of mathematical structures as well as the applications of mathematics. You will also learn some important techniques and principles that will be useful in your future studies and use of mathematics.

The list of topics we will visit during this semester will be taken from:

- **Sets and Logical Reasoning** The philosopher Epimenides said that all Cretans are liars ... but Epimenides was a Cretan. Do you believe him?
- **Complex Numbers and Polynomial Equations** Can every polynomial be factored into linear and quadratic factors? Try and factor $x^4 + 1$.
- **Induction** How many cannon balls do you need to make a pyramid with a square base and N balls on each side? (Hint: the first few answers are 1, 5, and 14.)
- **Platonic Solids and Euler's Formula** How many Platonic solids are there?
- **Prime Numbers, Congruence, and Secret Codes** How do RSA codes work? How is it possible to make a secure secret code with a public key? Is website encryption really secure?
- **Infinity** Are there more rational numbers than integers? Are there more real numbers than rational numbers? Can you list all the rational numbers? Can you list all the real numbers?
- **Symmetry** How many different symmetries can wallpaper designs have?
- **Fractals** We will discuss some ways of creating fractals - geometric objects that remain equally complicated no matter much you zoom in on them.
- **Topology** How do you determine whether two knots are the same if you have only have pictures of them?

3 Evaluation and Grading

Your grade in this course will be based on your work in weekly assignments, a midterm, a small project, and a final exam.

- Your *assignments* are due on Tuesdays and can be handed in in-class or until 5:30 PM in my office. Your lowest assignment grade will be dropped. Assignment questions and solutions, as well as any other course related hand-outs, will be posted on the course website. If you encounter any problems down loading or printing materials, please contact me.
- By the end of October you will receive a list of suggested topics for your project, with for each topic some questions to guide your research. You need to make an appointment with me so that we can discuss your choice of topic and which questions you will be addressing. Then you have the choice to either write a paper about your topic or give an in-class presentation.
- The written *final exam* will be three hours long. The time is set by the registrar. It will be during the official Dalhousie exam period (from December 9 till December 19, 2008). If you need to buy an airline ticket for your Christmas travels, please do so after the registrar has announced the exam dates, or plan to leave after December 17.

Grading Scheme

• Assignments	25%
• Midterm test (on Tuesday October 27)	25%
• Project	5%
• Final Exam	45%

Conversion into Letter Grades

$[0, 50)$	$=$	F	$[50, 54]$	$=$	D	$(54, 59]$	$=$	C^-	$(59, 64]$	$=$	C
$(64, 69]$	$=$	C^+	$(69, 72]$	$=$	B^-	$(72, 76]$	$=$	B	$(76, 80]$	$=$	B^+
$(80, 84]$	$=$	A^-	$(84, 92]$	$=$	A	$(92, 100]$	$=$	A^+			

4 Other Items

Disabilities Students with permanent or temporary disabilities who would like to discuss classroom or exam accommodations are asked to come and see me as soon as possible. You can meet me after class or privately during office hours. You also need to register with the Student Accessibility Services. To do so please phone 494-2836, email access@dal.ca, drop in at the new Mark A. Hill Accessibility Centre, or visit their website www.studentaccessibility.dal.ca All forms are now available on this website.

Academic Honesty The university policy states that all cases of academic misconduct *must* be handled through official channels. I have no latitude in this matter. I do encourage people to work in groups, but I must insist that each student write up their own homework. Please read the paragraphs on academic honesty on pages 21-26 in the Calendar.

H1N1 Flu Because of the anticipated H1N1-pandemic we may have to make changes to the above course outline and evaluation scheme. These changes may include but are not limited to:

- Adjustments to course assignments;
- Changes to the dates of exams;
- Arrangements for alternative evaluations for students affected by H1N1 influenza virus;

Any alternative plan made in individual courses may be superseded by University-wide or Government measures to reduce the spread of the pandemic H1N1 influenza virus.