

MATH 1010 Applied Finite Mathematics

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Acknowledgements

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<p>Content specialist biography</p> <p>Peter Aitchison was a University of Manitoba mathematics professor since 1969, starting as a member of the department of Mathematics and Astronomy and later transferring to a newly created department of Applied Mathematics. In 1999, these two mathematics departments were merged into the present department of Mathematics, where he was a professor. Professor Aitchison had conducted extensive research in mathematics and its applications. He published many research papers and a book on the theory of electrical circuits. In addition to teaching, he supervised graduate students. He was very interested in the uses of computers in his work and was the chairperson of the department's Systems, Software, and Technology Committee. His strong interest in effective teaching had led him to take many courses on teaching and made extensive use of computer technology to help students in his courses. He also gave invited talks at conferences on the use of computer technology in teaching.</p>	
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Course Syllabus

Contacting your instructor

For information on contacting your instructor as well as other important information from your instructor, see the Instructor Letter link in your course website.

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Course description

The *University of Manitoba Undergraduate Calendar* describes this course as follows:

For students needing to fill the requirement of a university level mathematics course. Introduces students to modern applications of discrete mathematics. Topics include: mathematics of finance, linear programming, graph theory, and game theory. Cannot be held with any current (1000 level) or previously offered (100 level) Mathematics course with the exception of MATH 1190 or MATH 1191 (136.119). This course cannot be used as part of an Honours, Major, General or Minor program in the mathematical sciences. No prerequisite.

This course is intended to be a user-friendly mathematics course that is both attainable and interesting, even for students with fairly weak backgrounds in high school mathematics. The course is divided into units, each covering a mathematical topic that is both interesting and potentially useful to students in their future careers. The course begins with a review of some high school mathematics, but later topics introduce material that will be new to most students. Past experience has shown that most students pass this course and find it to be an enjoyable experience, even those students who previously found mathematics to be unpleasant.

Welcome to MATH 1010, Applied Finite Mathematics. We hope you find the course to be both rewarding and challenging.

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Course objectives

Upon completion of this course you should be able to:

- use some of the skills from the high school curriculum, including solving equations and inequalities with one variable, and graphing of functions and inequalities of one variable, and apply these skills to real-life applications;

- use some extensions of the skills from the high school curriculum, including solving and graphing inequalities with two variables, defining and working with matrices, solving systems of linear equations using matrices, and be able to apply these skills to real-life applications;
- explain the concepts and rules involved in a number of different mathematical areas, such as graph theory, matrices, linear programming, codes, and financial mathematics;
- solve basic mathematical problems in a number of different areas, such as graph theory, matrices, linear programming, codes, and financial mathematics;
- apply the skills developed in a number of different mathematical areas, such as graph theory, matrices, linear programming, codes, and financial mathematics to real-life applications;
- translate real-life problems into mathematical problems that can be solved by the methods you have learned in different areas, such as graph theory, matrices, linear programming, codes, and financial mathematics; and complete solution to a problem so that it is easily understood by others.

You will also be able to demonstrate:

- increased confidence in your ability to understand and use mathematics; and
- a view of mathematics as something that is logical and makes good sense.

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Course materials

Required textbooks

There are no required textbooks for this course. All of your course materials are online.

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Required Hardware and software

- You should have available a reasonably modern computer and be comfortable in using it. Rough minimum guidelines are: 200 Mhz or greater CPU, CD drive, 64 MB RAM or more, 20 MB or more free hard disk space. More hard disk space will be required if a web browser must be installed. A good monitor with a resolution of 800 by 600 is an asset.
- You must have an Internet connection and be able to send and receive e-mail. You will be required to follow instructions to install some software, to download and upload files over the Internet, and to use new software programs.
- **Software:** The required browser is Firefox 3 or Internet Explorer 7.

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Distance and Online Education (DE) student resources

In your course website there are links for the following:

- Contact Distance and Online Education Staff;
- Distance and Online Student Handbook; and

- Distance and Online Education Website.

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Course overview

You will be required to complete Unit 1, Equations and Inequalities first. This unit is a review and extension of some high school mathematics and applications. Next, you are required to complete Unit 2, Matrices and Systems of Equations, that includes real-life applications and is a significant extension of the high school coverage of this material. Then students must complete Unit 3, Graph Theory; Unit 5, Linear Programming; and Unit 6, Financial Mathematics.

To complete a unit you must:

1. Read the unit notes, using the hypertext links to go to further explanations, examples, and practice material. While reading each new mathematical topic, carefully look over all of the mathematical example problems, ensuring that the mathematics is correct and that the reasons for each step are clear.
2. Do all of the practice problems suggested in the unit notes. This involves doing problems that are based on the unit notes and are similar to the worked examples.
3. Complete the self-test questions for each unit, with a minimum amount of help from the text. This exercise is designed to test your overall knowledge of the unit and to indicate areas of weakness where further study is needed.
4. Complete the assignment for the unit and submit it to the designated UMLearn Dropbox. For instructions on submitting your assignment, click on the "How to submit" link in the Instruction for Assignment widget in UMLearn.

Topics

Unit 1: Equations and Inequalities

1. Review of solutions of equations and inequalities with one variable and showing the solutions geometrically on the number line
2. Review of graphs of functions of one variable (graphing, slope, intercepts, intersections of two lines, finding equations from given data)
3. Graphing solutions of inequalities with two variables
4. Applications

Unit 2: Matrices and Systems of Equations

1. Matrices: definition, adding/subtracting matrices, multiplying matrices, transposing matrices, inverse matrices
2. Solving systems of linear equations using the augmented matrix and row operations
3. Applications

Unit 3: Graph Theory

1. Graph theory: basic definitions and examples
2. Circuits and paths in graphs
3. Graphs, digraphs, and matrices
4. Applications of graphs

Unit 5: Linear Programming

1. Examples of linear programming
2. Solving linear programs with two variables by the method of corners
3. Applications of linear programming

Unit 6: Financial Mathematics

1. Mathematics formulae for finance
2. Applications

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Evaluation and grading

In this course there are five unit assignments and a final examination. The distribution of marks is listed below.

You will be required to complete Unit 1, Equations and Inequalities first. This unit is a review and extension of some high school mathematics and applications. Next, you are required to complete unit 2, Matrices and Systems of Equations, that includes real-life applications and is a significant extension of the high school coverage of this material. Then students must complete Unit 3, Graph Theory; Unit 5, Linear Programming; and Unit 6, Financial Mathematics. Unit 4 has been deleted from the course for this course section.

Distribution of marks

Five unit assignments (8% for each unit)	40%
Final examination Note: Students are required to obtain a minimum grade of 40% on the final exam in order to pass the entire course regardless of term work grades.	60%
Total	100%

Grading scale

Letter grade	Percentage range	Description
A+	90-100	Exceptional
A	82-89	Excellent
B+	75-81	Very good
B	68-74	Good
C+	61-67	Satisfactory
C	52-60	Adequate
D	50-51	Marginal
F	0-49	Failure

Please note: All final grades are subject to departmental review.

Final examination

Students are required to obtain a minimum grade of 40% on the final exam in order to pass the entire

course regardless of term work grades.

The final exam will be written at the University of Manitoba (UM), Fort Garry campus or at an approved off-campus location. **Students needing to write at an off-campus location must declare a location by the specified deadline date** (see off-campus declaration and policy under Student Resources on course homepage). **Students writing at the UM Fort Garry campus do not need to declare an exam location.**

The Registrar's Office is responsible for the [final exam schedule](#) which is available approximately one month after the start of the course.

The final examination will be a similar format and level of difficulty as the assignments. It will consist of long answer questions similar to what you experienced on the assignments, and will be two hours in length. The final examination will test your knowledge of all of the course units that you have taken. It will be conducted during the regular University examination period.

A word of caution about the assignments and the final examination

Some students find that they do very well on the assignments, but they do not do nearly as well on the final examination. While your grades on the assignments will give you some idea of how well you are mastering the material, they may not indicate how well you will do on the examination, because the examination is written under very different circumstances. Because the assignments are open book, they do not require the amount of memorization that a closed-book examination requires nor are they limited to a specific time period. Some students have told us that, based on the high marks they received on the assignments, they were overconfident and underestimated the time and effort needed to prepare for the final examination.

Please keep all this in mind as you prepare for the examination. If your course has a sample exam or practice questions, use them to practice for the examination by setting a time limit and not having any books available. Pay careful attention to the description of the type of questions that will be on your final examination. Preparing for multiple choice questions involves a different type of studying than preparing for essay questions.

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Assignment due dates

The assignments are due after each unit.

Assignment	Sept.-Dec.	Jan.-Apr.	May- Aug.
1	Sept. 23	Jan. 21	May 21
2	Oct. 10	Feb. 7	June 4
3	Oct. 27	Feb. 27	June 18
4	Nov. 13	Mar. 13	July 2
5	Nov. 30	Mar. 30	July 16

Note: If the assignment due date falls during the Mid-term Break in February, it

will be due on the Monday following the Mid-term Break. If you are unable to submit an assignment on time, contact your instructor well in advance of the due date, for we cannot guarantee that the instructor will accept late assignments.

Students should acquaint themselves with the University's policy on plagiarism, cheating, and examination impersonation as detailed in the General Academic Regulations and Policy section of the *University of Manitoba Undergraduate Calendar*. Note: These policies are also located in your *Distance and Online Education Student Handbook* or refer to Student Affairs at http://umanitoba.ca/student/resource/student_advocacy/cheating_plagiarism_fraud.html

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