

Canterbury High School

Ottawa-Carleton District School Board

Mathematics Department

Semester I – 2010 / 11 – Course Outline

Course Title: Data Management	Grade Level: 12
Course Code: MDM4U	Credit Value: 1.0
Prerequisite: MCR3U OR MCF3M	

Teachers: M. Corrigan

Course Overview 110 hours

This course broadens students' understanding of mathematics as it relates to managing data. Students will apply methods for organizing and analyzing large amounts of information; solve problems involving probability and statistics; and carry out a culminating investigation that integrates statistical concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. Students planning to enter university programs in business, the social sciences, and the humanities will find this course of particular interest.

Strands:

Course Expectations

As students work through the course they will develop a set of skills that will support lifelong learning in mathematics. These skills are a set of seven mathematical processes that are embedded throughout all of the course expectations; they are, problem-solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating. This course will provide students with rich problem-solving opportunities that will help the student develop and apply these processes.

A. Counting and Probability

By the end of this course, students will:

1. solve problems involving the probability of an event or a combination of events for discrete sample spaces;
2. solve problems involving the application of permutations and combinations to determine the probability of an event.

B. Probability Distributions

By the end of this course, students will:

1. demonstrate an understanding of discrete probability distributions, represent them numerically, graphically, and algebraically, determine expected values, and solve related problems from a variety of applications;
2. demonstrate an understanding of continuous probability distributions, make connections to discrete probability distributions, determine standard deviations, describe key features of the normal distribution, and solve related problems from a variety of applications.

C. Organization of Data for Analysis

By the end of this course, students will:

1. demonstrate an understanding of the role of data in statistical studies and the variability inherent in data, and distinguish different types of data;
2. describe the characteristics of a good sample, some sampling techniques, and principles of primary data collection, and collect and organize data to solve a problem.

D. Statistical Analysis

By the end of this course, students will:

1. analyze, interpret, and draw conclusions from one-variable data using numerical and graphical summaries;
2. analyze, interpret, and draw conclusions from two-variable data using numerical, graphical, and algebraic summaries;
3. demonstrate an understanding of the applications of data management used by the media and the advertising industry and in various occupations.

E. Culminating Data Management Investigation

By the end of this course, students will:

1. design and carry out a culminating investigation that requires the integration and application of the knowledge and skills related to the expectations of this course;
2. communicate the findings of a culminating investigation and provide constructive critiques of the investigations of others.

Units of Study

1. Probability (~3 weeks)
Students will determine and interpret experimental and theoretical probability and will have the opportunity to learn proper counting techniques, notation and vocabulary. Students will also solve counting and probability problems in situations when order does and does not matter.
2. Probability Distributions (~2 weeks)
Students will create theoretical probability distributions and analyze simulations that can be modelled using binomial and hyper-geometric probability distributions. Students will also study and compare discrete random variables and continuous random variables and determine expected values.
3. Posing Questions With Data (~2 weeks)
Students will develop significant conclusions about a data set as well as explore some of the misuses of data. Students will also use scatter plots and the correlation coefficient to describe the relationship between two variables.

4. In Search of Good Data (~2 weeks)
Students will retrieve, organize and manipulate data in order to answer significant questions. Students will also learn about the need for a variety of sampling techniques as well as be able to identify different types of bias.
5. Tools For Analyzing Data (~3 weeks)
Students will acquire the tools to analyse and graph one-variable and two-variable data. Students will determine and interpret the measures of central tendency and deviation as well as use the normal distribution to describe a population and to make comparisons between one value and the rest of the normal distribution.
6. Culminating Investigation (~6 weeks)
Students will complete a major project of their choosing on a topic or issue of significance that requires the integration and application of the expectations of the course. They will also present their project to an audience and critique the projects of others.

Teaching Strategies

Students will have the opportunity to learn in a variety of ways: individually, cooperatively, investigative, teacher-directed class discussion, notes, visual aids, computer software (Excel and Fathom) and manipulatives (e.g., graphing calculators).

Assessment and Evaluation Strategies

Student achievement will be monitored through the use of formative assessments in the form of quizzes, assignments, observations. Feedback on these assessments will provide the student with information to determine their level of understanding of the concepts. Student achievement will be recorded through the use of quizzes, tests and assignments/tasks. The percentage grade will represent the quality of the student's overall achievement of the expectations for the course and reflect the corresponding level of achievement as described in the achievement chart.

Evaluation Summary

Term Evaluation (70%) comprised of:

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|----|--|-------|
| a) | <u>Knowledge and Understanding</u>
(understand the concepts and computational skills of specific expectations) | 24.5% |
| b) | <u>Application</u>
(knowing when and how to use appropriate tools and concepts to solve problems) | 24.5% |
| c) | <u>Thinking</u>
(being able to use critical and creative thinking skills to solve problems, connect ideas from other strands) | 10.5% |
| d) | <u>Communication</u>
(reflect and express through writing a mathematical solution or concept) | 10.5% |

Summative Evaluation (30%) comprised of:

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|----|---|-----|
| a) | <u>Summative Task</u> (problems using a variety of tools) | 20% |
| b) | <u>Examination</u> | 10% |

References

www.edu.gov.on.ca/eng/curriculum/secondary/math1112currb.pdf

Student Resources / Texts

1. Mathematics of Data Management: Nelson Mathematics 12
2. Finite Mathematics, McGraw-Hill Ryerson
3. Various other texts and resources (e.g., www.oame.on.ca)