

## **MDM4U – Mathematics of Data Management**

### **GENERAL INFORMATION**

Name of School: Rosedale Academy

Department: Mathematics

Course Developer: Asim Sayed

Development Date: Dec 4, 2014

Revision Date: August 2017

Course Title: Mathematics of Data Management

Grade: 12

Course Type: University Preparation

Course Code: MDM4U

Credit Value: 1

Curriculum Policy Document: The Ontario Curriculum Grades 11 and 12 Mathematics, Ministry of Education 2007 (Revised)

**Prerequisite:** Functions, Grade 11, University Preparation, or Functions and Applications, Grade 11, University/College Preparation

## **COURSE DESCRIPTION**

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.

## **PART OVERALL EXPECTATION / LEARNING OBJECTIVES**

### **Counting and Probability**

By the end of this course, students will:

A1 – Solve problems involving the probability of an event or a combination of events for discrete sample spaces

A2 – Solve problems involving the application of permutation and combinations to determine the probability of an event

E1 – Design and carry out a culminating investigation that requires the integration and application of the knowledge and skills related to the expectation of this course

E2 – Communicate the findings of a culminated investigation and provide constructive critiques of the investigation of others

### **Organization of Data for Analysis**

By the end of this course, students will:

C1 – Demonstrate an understanding of the role of data in statistical studies and the variability inherent in data, and distinguish different types of data

C2 – Describe the characteristics of a good sample, some sampling techniques, and principles of primary data collection and organize data to solve a problem

E1 – Design and carry out a culminating investigation that requires the integration and application of the knowledge and skills related to the expectation of this course

### Statistical Analysis

By the end of this course, students will:

D1 – Analyse, interpret, and draw conclusions from one-variable data using numerical and graphical summaries

D2 – Analyse, interpret, and draw conclusions from two-variable data using numerical, graphical, and algebraic summaries

D3 – Demonstrate an understanding of the applications of data management used by the media and the advertising industry and in various occupations

E1 – Design and carry out a culminating investigation that requires the integration and application of the knowledge and skills related to the expectation of this course

E2 – Communicate the findings of a culminated investigation and provide constructive critiques of the investigation of others

### Probability Distributions

By the end of this course, students will:

B1 – 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

E1 – Design and carry out a culminating investigation that requires the integration and application of the knowledge and skills related to the expectation of this course

E2 – Communicate the findings of a culminated investigation and provide constructive critiques of the investigation of others

### Modelling Continuous Data

By the end of this course, students will:

D1 – Analyse, interpret, and draw conclusions from one-variable data using numerical and graphical summaries

B2 – 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

## OUTLINE OF COURSE CONTENT

	Name of Unit	Time Allocated in Hours
Unit 1	Counting and Probability	26 Hours
Unit 2	Organization of Data for Analysis	19 Hours
Unit 3	Statistical Analysis	25 Hours
Midterm report cards		
Unit 4	Probability Distributions	20 Hours
Unit 5	Modelling Continuous Data	20 Hours
	Final Examination	
	TOTAL	110 Hours

## TEACHING / LEARNING STRATEGIES

The strategies used are varied to meet the needs and the range of learning styles encountered and they include the following:

- |                                  |                       |
|----------------------------------|-----------------------|
| Articulate Learning Module       | Brainstorming         |
| Computer Assisted Learning       | Decision Making       |
| Direct Instruction               | Demonstration         |
| Animated Games                   | Discussion            |
| Group Discussion                 | Estimating            |
| iSpring Presentation / Animation | Independent Study     |
| Online Graphing Software         | Memorization          |
| Problem-Based Learning           | Model Analysis        |
| Work and Task Sheet              | Note Taking           |
| Interactive Online Activity      | Oral Explanation      |
|                                  | Opinion Writing       |
|                                  | Peer Assessment       |
|                                  | Problem Solving       |
|                                  | Reasoning and Proving |
|                                  | Self-Assessment       |

## STRATEGIES FOR ASSESSMENT AND EVALUATION OF STUDENT PERFORMANCE

Evaluation in this course will be continuous throughout the year and will include a variety of evaluation methods. Assessment is embedded in the lessons throughout a unit under Check-Up Time.

Assessment as Learning	Assessment for Learning	Assessment of Learning
<b>Student Product</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Journals/Letters/Emails (checklist)</li> <li><input type="checkbox"/> Learning Logs (anecdotal)</li> <li><input type="checkbox"/> Peer Assessments</li> <li><input type="checkbox"/> Practice Worksheets</li> </ul>	<b>Student Product</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Check-up Time Assessments</li> <li><input type="checkbox"/> Journals/Letters/Emails (checklist)</li> <li><input type="checkbox"/> Pre-Skills Checks (scale)</li> <li><input type="checkbox"/> Quizzes (scale)</li> <li><input type="checkbox"/> Graphic organizers (scale)</li> <li><input type="checkbox"/> Peer feedback (anecdotal)</li> <li><input type="checkbox"/> Reports</li> <li><input type="checkbox"/> Rough Drafts</li> <li><input type="checkbox"/> Practice Worksheets</li> </ul>	<b>Student Product</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Assignments</li> <li><input type="checkbox"/> Journals/Letters/Emails (checklist)</li> <li><input type="checkbox"/> Unit Tests (scale)</li> <li><input type="checkbox"/> Final Exam</li> <li><input type="checkbox"/> Case Studies</li> <li><input type="checkbox"/> Presentations</li> <li><input type="checkbox"/> Graphic organizers (scale)</li> <li><input type="checkbox"/> Rough Drafts</li> <li><input type="checkbox"/> Individual projects</li> </ul>
<b>Observation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Whole class discussions (anecdotal)</li> <li><input type="checkbox"/> Self-proofreading (checklist)</li> </ul>	<b>Observation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class discussions (anecdotal)</li> <li><input type="checkbox"/> Problem Solving</li> </ul>	<b>Observation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Presentations</li> </ul>
<b>Conversation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Student teacher conferences</li> <li><input type="checkbox"/> Small Group Discussions (checklist)</li> <li><input type="checkbox"/> Pair work (checklist)</li> <li><input type="checkbox"/> Skype meetings</li> </ul>	<b>Conversation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Student teacher conferences</li> <li><input type="checkbox"/> Small group discussions (checklist)</li> <li><input type="checkbox"/> Pair work (anecdotal)</li> <li><input type="checkbox"/> Peer-feedback (anecdotal)</li> <li><input type="checkbox"/> Peer-editing (anecdotal)</li> </ul>	<b>Conversation</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Question and Answer Session (checklist)</li> <li><input type="checkbox"/> Oral tests (scale)</li> <li><input type="checkbox"/> Oral Presentation with question and answer session</li> </ul>

## FINAL GRADE

The percentage grade represents the quality of the students' overall achievement of the expectations for the course and reflects the corresponding achievement as described in the achievement chart for mathematics.

1. Term work will be 70% of the overall grade for the course;
2. The summative evaluations will be 10% of the overall grade, incorporating an ISU (Independent Study Unit or Research Project)
3. The summative evaluations will be 20% of the overall grade, incorporating a final written examination.

### Achievement Categories

Application:	25%	Knowledge and Understanding:	25%
Communication:	25%	Thinking/Inquiry:	25%

### Achievement Chart

A Summary Description of Achievement in Each Percentage Grade Range And Corresponding Level of Achievement

Percentage Grade Range	Achievement Level	Summary Description
80–100%	Level 4	A very high to outstanding level of achievement. Achievement is above the provincial standard.
70–79%	Level 3	A high level of achievement. Achievement is at the provincial standard.
60–69%	Level 2	Moderate level of achievement. Achievement is below, but approaching the provincial standard.
50–59%	Level 1	A passable level of achievement. Achievement is below the provincial standard
Below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted

## RESOURCES REQUIRED BY THE STUDENT

MDM4U Online Course of Study

Calculator with Statistics functions is recommended

## PROGRAM PLANNING CONSIDERATION

### Role of Technology in the Curriculum

Rosedale Academy courses leverage the power of information and communication technologies to provide rich, dynamic learning experiences. Students explore, evaluate and create concepts and works using a wide array of digital tools. They demonstrate their learning through text, video, voice and visual assignments that teach multi-literacy and media skills. Students also enhance their computer and technology skills in ways that are useful for their future academic and personal pursuits.

Teachers at Rosedale Academy get to know their learners, provide rich, descriptive feedback and assess student contributions and products AS, FOR and OF learning through digital technologies. They enable rapid feedback and communication at any time without borders in our global community.

Tool	Use	Benefit
<b>Discussion forums</b>	Whole class discussion (written)	Creates a record of each student's contributions
<b>Group activities</b>	Small group collaboration and discussion (written)	Encourages student participation; creates a record
<b>Live Skype sessions</b>	Teacher leads the lesson with students as a class	Observations of whole class and individual students
<b>Peer Teaching</b>	Students research a given topic and share their findings and opinions with other students.	Fosters discussion between students and allows for content to be learned and expressed from a student perspective
<b>Journals</b>	Small group discussions using problem solving	Improves students' critical inquiry, and reflective thinking skills about the concepts learned within the course
<b>Learning Modules</b>	Students explore content in an interactive manner with built-in assessments as they progress.	Students can navigate content at their own pace and assess their own learning along the way.
<b>Computer Simulations</b>	Individual or class exploration and visualization of concepts relating to the curriculum.	Allows hands-on exploration and investigation as an alternative learning strategy.

**English as a Second Language**

Rosedale Academy provides students with comprehensive ESL support to enhance their proficiency with the English language.

- All Rosedale Academy instructional materials and resources are designed with English Language Learners in mind. Online and face-to-face instructional resources make use of differentiated learning methods and carefully structured language. These resources support English language development as students are taking credit courses in all academic fields.
- Teachers at Rosedale Academy provide a variety of accommodations for English Language Learners. These accommodations include: extended time for tests and exams; chunking of assignments and tests; a safe space for asking questions; formative feedback; mini-lessons in spelling, sentence structure and grammar; and access to ESL resources and expert discussion.
- The self-paced delivery method of this course allows students to take the time that they require to engage in meaningful participation while still enjoying the enriching experience of working in an online global classroom.
- All teachers at Rosedale Academy are responsible for helping students to develop their ability to use English in academic courses.

**Career Education**

This course promotes skills effective for a variety of careers and informs students of some of the career opportunities where oral and written communication is considerable assets. Students will learn how to use English to inform audiences about ideas, persuade audiences to change their opinion or buy a product, and to formulate ideas. Students will also understand the importance of social media in their search for future education and career opportunities. Finally, this course also helps to prepare students for university application by providing a unit that helps them write a persuasive application essay. Beyond the immediate needs of the student, this also course focuses on demonstrating the value of English in jobs like business where clear communication is highly valued.

**Academic Integrity**

Students are expected to maintain high standards of honesty and academic integrity throughout their participation in all courses. This includes avoiding any instance of fraud, plagiarism and cheating. Rosedale Academy takes the following steps to ensure academic integrity:

- Students provide photo identification
- Course assignments include audio and video components
- Teachers Skype weekly with their classes
- Students are encouraged and supported to develop original work
- Exams are proctored by adults in trusted positions

When a teacher has reasonable grounds to believe that a student has violated these standards, the school principal will review the incident and, if needed, enforce disciplinary procedures. More information about *Academic Honesty* may be found in section 5.3 of the school calendar.

**Late and Missed Assignment**

Independent students have up to 12 months to complete a course. There are no set deadlines for course assignments. Students can proceed through each course at their own pace, but all course requirements must be completed prior to writing their final exam.

Cohort students follow a schedule in each course. This schedule specifies the due dates for all assignments. Students may request an extension if they are unable to meet a specific due date. Rosedale Academy reserves the right to deny any request. Late or missed assignments are not accepted without a valid reason.