INSTITUTE OF CANADIAN EDUCATION

Course Title: Mathematics of Data Management, Grade 12

Course Name: Mathematics of Data Management

Course Code: MDM4U

Grade: 12

Course Type: University Preparation

Credit Value: 1.0

Prerequisite: MCF3M or MCR3U Functions, Grade 11, University Preparation, or Functions and Applications, Grade 11, University/College Preparation

Curriculum Policy Document: The Ontario Curriculum, Grades 11–12: Mathematics, 2007 (Revised);Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)

Course Developer: Institute of Canadian Education

Department: Mathematics

Head of Department: Meena Yohan

Development Date: 2025

Most Recent Revision Date: August 2026

Course Description

This course broadens students' understanding of mathematics as it relates to managing data. Students will apply methods for organizing and analysing 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.

COURSE EXPECTATION

Unit	Title	Description	Time
1	Introduction to Probability	Students are introduced to probability concepts and notation. They explore the Law of Large Numbers, mutually and non-mutually exclusive events, compound events, and dependency. Focus is on understanding fundamental probability principles and applying them to problems.	18 Hours
2	Probability involving Counting Principles, Permutations, and Combinations	Students learn to solve probability problems using counting techniques, including the slot method, factorials, permutations, and combinations. Emphasis on applying these techniques to real-world situations.	18 Hours
3	Discrete Probability Distributions	Students explore discrete probability distributions, including binomial and hypergeometric distributions. They learn to select and apply the appropriate distribution to solve problems and interpret results.	18 Hours
4	Organization of Data for Analysis	Students study types of data, collection methods (observations, experiments, surveys, sampling), and the uses and misuses of data. Emphasis on organizing and preparing data for analysis.	15 Hours
5	One and Two Variable Statistics	Students analyze data using measures of central tendency and spread, graphical displays, and correlation analysis for one and two variables. Focus on interpreting and communicating results accurately.	17 Hours
6	Continuous Probability Distribution: The Normal Distribution	Students examine continuous probability distributions, frequency polygons, the normal curve, z-scores, percentiles, and probabilities. Emphasis on applying normal distribution to real-world contexts.	12 Hours
7	Culminating Activities	Students apply their learning in practical tasks such as a Games Fair, game creation report, and a statistical analysis project. These activities synthesize course concepts and	10 Hour

		demonstrate mastery.	
	FINAL EXAM	Proctored exam assessing all course content; contributes to final grade.	2 Hours
	Total		110 Hours

Overall Curriculum Expectations:

A. Introduction to Probability	
A1	Introduction to Probability Concepts and Notation
A2	The Law of Large Numbers
A3	Working with Mutually and Non-Mutually Exclusive Events
A4	Compound Events and Dependency
A5	Summative Assessment
B. Probability involving Counting Principles, Permutations, and Combinations	
B1	The Slot Method
B2	Factorials and Permutations
B3	Introduction to Combinations
B4	Applying Permutations and Combinations
B5	Summative Assessment
C. Discrete Probability Distributions	
C1	Representing Probability Distributions
C2	The Binomial Distribution
C3	The Hypergeometric Distribution
C4	Selecting and Applying the Appropriate Distribution
C5	Summative Assessment
D. Organization of Data for Analysis	

D1	Introduction to Data
D2	Types of Data
D3	Uses and Misuses of Data
D4	Collecting Primary Data: Observations and Experiments
D5	Collecting Primary Data: Sampling the Population
D6	Collecting Primary Data: Effective Surveys
D7	Summative Assessment
E. One and Two Variable Statistics	
E1	One Variable Analysis - Measures of Central Tendency
E2	One Variable Analysis - Measures of Spread
E3	One Variable Analysis - Graphical Displays of Data
E4	Two Variable Analysis - Linear Correlation
E5	Two Variable Analysis - Correlation Type
E6	Summative Assessment
F. Continuous Probability Distribution: The Normal Distribution	
F1	Continuous vs. Discrete
F2	The Frequency Polygon
F3	The Normal Curve
F4	z-Scores, Percentiles and Probabilities
F5	Summative Assessment
G. Culminating Activity	
G1	Games Fair and Game Creation Report • Games Fair
G2	Statistical Analysis • Data Analysis Project
FINAL EXAM	

Assessment

Students will be provided with numerous and varied opportunities to demonstrate the full extent of their achievement of the curriculum expectations, across all four categories of the Achievement Chart. Progress will be monitored on an on-going basis using a variety of assessment tools, including written work, formal testing, quizzes, teacher-student communication, discussion boards and chat rooms.

As required by the Ministry of Education, students will be assessed in the four areas of the achievement chart. The suggested breakdown for this course is as follows:

Assessment Category	Percentage
Knowledge and Understanding	25%
Thinking and Inquiry	25%
Communication	25%
Application	25%

Final Grade

The final grade will be determined as follows (in accordance with Ministry of Education standards):

Term Work Based on evaluations conducted throughout the course.	65%
Final Evaluation A final evaluation in the form of a written exam.	25%
Attendance and Participation	10%

Final Examination Breakdown

- 25% written exam

CONSIDERATIONS FOR PROGRAM PLANNING

PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

Teachers support all students through evidence-based instruction, Universal Design for Learning (UDL), and differentiated instruction, consistent with *Learning for All* (2013). Where applicable, IEP accommodations are implemented in instruction, the learning environment, and assessment. Online learning provides flexibility through extended time, breaks, assistive technology, and opportunities to review course materials.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

Teachers consider the strengths and needs of English language learners and provide appropriate supports without changing curriculum expectations. Supports may include visual and multimedia resources, simplified instructional language, opportunities to review lessons, extended time, bilingual dictionaries, and feedback that develops academic English.

ENVIRONMENTAL EDUCATION

Environmental education is integrated throughout the curriculum. Students develop knowledge, skills, and responsible attitudes toward environmental issues and apply course concepts to real-world environmental data and situations.

EQUITY AND INCLUSIVE EDUCATION

The course promotes a welcoming, respectful, and inclusive learning environment. Materials and activities reflect diverse cultures, perspectives, identities, and experiences, while assessment practices are fair and designed to reduce bias.

FINANCIAL LITERACY EDUCATION

Students develop skills for informed financial decision-making and apply course concepts to financial contexts. Activities may include interpreting statistics, evaluating financial information, and analyzing data used in advertising and financial reporting.

FIRST NATIONS, MÉTIS, AND INUIT EDUCATION

Program planning aligns with the Ontario First Nation, Métis, and Inuit Education Policy Framework (2007). Where appropriate, students engage with accurate and respectful Indigenous perspectives, histories, cultures, contributions, and contemporary issues using appropriate resources.

THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

ICT is integrated into instruction, learning, assessment, and communication. Students use digital texts, multimedia, simulations, video conferencing, and productivity tools while developing digital citizenship, responsible technology use, source evaluation, privacy awareness, and academic integrity.

CAREER EDUCATION

Students connect course learning with education, career, and life-planning goals. Activities develop transferable skills such as problem-solving, reasoning, communication, and quantitative thinking and highlight connections to postsecondary education and career pathways.

COOPERATIVE EDUCATION AND OTHER FORMS OF EXPERIENTIAL LEARNING
Where appropriate, students may connect course learning with experiential opportunities such as job shadowing, work experience, and cooperative education. These experiences support career exploration and workplace skill development.

HEALTH AND SAFETY
Health and safety are addressed in both learning activities and the online environment. Students are encouraged to practise proper ergonomics, maintain healthy screen-time habits, take regular breaks, and follow school expectations for safety, privacy, respectful conduct, and well-being.

ACCOMMODATIONS
Accommodations are determined through consultation with parents/guardians, teachers, administration, and relevant educational assessments. They may include:

- **Instructional accommodations:** varied teaching strategies, presentation methods, organization, technology, and multimedia.
- **Assessment accommodations:** additional time, alternative response formats, or oral responses where appropriate.
- Step-by-step instructions and organizational supports.
- Writing organizers and planning tools.
- Scribe or note-taking support when required.
- Flexible reading and writing options.
- Advance access to reading materials when appropriate.

Required Software, Equipment, and Textbooks – MDM4U

Texts & Resources
- Grade 12 Data Management textbook (Ontario approved)
- Teacher-provided worksheets, problem sets, and inquiry packages
- Supplementary materials: probability and statistics reference guides, sample datasets

Digital Resources
- Google Drive or equivalent cloud storage for file sharing and submission
- Microsoft Office / Google Workspace (Word, Excel, Google Sheets) for assignments, data organization, and analysis
- Online mathematics and statistics tools (Desmos, GeoGebra, Khan Academy, StatCrunch, or similar interactive platforms)
- Online simulations for probability experiments and data visualization

Teacher Considerations
- Assistive technology: speech-to-text or text-to-speech software for students requiring accommodations
- Flexible submission formats: digital submissions, scanned handwritten work, or typed solutions depending on student needs
- Optional tools: calculators (graphing or scientific) approved by the teacher for assignments and exams

Tips for Success – MDM4U

Welcome to MDM4U: Grade 12 Data Management – University Preparation

Welcome! This course will help you develop a strong understanding of data management and probability concepts. You will strengthen your analytical, problem-solving, and reasoning skills, which are essential for university-level programs in business, social sciences, and the humanities, as well as real-world applications involving data analysis and interpretation.

Stay Organized

- Review the course calendar regularly and complete all assignments, quizzes, projects, and data analysis tasks on time.
- Carefully read instructions and rubrics; use checklists to ensure all steps, calculations, graphs, and interpretations are complete and accurate.

Ask for Help

- For technical issues, contact the Help Desk.
- For course-related questions, email your teacher; expect a response within 24 hours. Mark emails as "URGENT" if needed.

Key Elements to Success

- **Time Commitment:** Plan for 1–2 hours of focused study each day, plus additional time for practice problems, probability simulations, data collection, and analysis projects.
- **Communication:** Maintain regular contact with your teacher for guidance, clarification, and feedback.
- **Engagement:** Stay curious, persistent, and attentive. Active participation in discussions, simulations, and projects, along with consistent practice in solving probability and statistics problems, is essential for mastering MDM4U concepts.

Remember: This course is designed to help you analyze and interpret data, understand probability, and apply mathematical reasoning to solve real-world problems. Approach all activities thoughtfully, accurately, and with confidence in your ability to learn, interpret, and succeed.