Forest Hill Collegiate Institute
Course of Study and Evaluation Statement

Mathematics of Data Management, Grade 12: University Preparation

Note 1: All Ontario Ministry of Education curriculum documents with full course content information can be located at http://www.edu.gov.on.ca/eng/curriculum/secondary/subjects.html

Note 2: Detailed information on Ministry of Education assessment, evaluation, and reporting policy is provided in *The Ontario Curriculum, Grades 9 to 12: Program Planning and Assessment, 2000*, located at http://www.edu.gov.on.ca/eng/curriculum/secondary/progplan912curr.pdf

1. Course Details

- Program Area: Mathematics
- Course title: Mathematics of Data Management, Grade 12, University Preparation (MDM4U). Credit Value 1.0
- Prerequisite: Grade 11 Functions & Applications or Functions
- Textbook(s) and resource materials that are essential to the course:
  Mathematics of Data Management; Nelson-Thomson Learning; 2002

2. Overall Goals

- Course Description:
  This course broadens students' understanding of mathematics as it relates to managing information. Students will apply methods for organizing large amounts of information; apply counting techniques, probability, and statistics in modelling and solving problems; and carry out a culminating project that integrates the expectations of the course and encourages perseverance and independence. Students planning to pursue university programs in business, the social sciences, or the humanities will find this course of particular interest.

- Overall Expectations are in the areas of Organization of Data for Analysis; Counting and Probability, Statistics; and Integration of the Techniques of Data Management. By the end of the course, students will:
  - in **Organization of Data for Analysis**:
    * organize data to facilitate manipulation and retrieval;
    * solve problems involving complex relationships, with the aid of diagrams;
    * model situations and solve problems involving large amounts of information, using matrices.
  - in **Counting and Probability**
    * solve counting problems and clearly communicate the results;
    * determine and interpret theoretical probabilities, using combinatorial techniques;
    * design and carry out simulations to estimate probabilities.
  - in **Statistics:**
    * demonstrate an understanding of standard techniques for collecting data;
    * analyse data involving one variable, using a variety of techniques;
    * solve problems involving the normal distribution;
    * describe the relationship between two variables by interpreting the correlation coefficient;
    * evaluate the validity of statistics drawn from a variety of sources.
  - in **Integration of the Techniques of Data Management:**
    * carry out a culminating project on a topic or issue of significance that requires the integration and application of the expectations of the course;
    * present a project to an audience and critique the projects of others.

- Specific Curriculum Expectations

Please refer to Ontario Ministry of Education curriculum document for details of Overall and Specific Expectations, found at http://www.edu.gov.on.ca/eng/curriculum/secondary/math1112curr.pdf

3. Program Planning Considerations

- *Individual Education Plan*: Accommodations to meet the needs of exceptional students as set out in their Individual Education Plan will be implemented within the classroom program. Additional assistance is available through the Special Education program.
- *The Role of Technology in the Curriculum.* Using information technology will assist students in the achievement of many of the expectations in the curriculum regarding research, written work, analysis of information, and visual presentations. The computer and the calculator are important problem-solving tools to be used for many purposes. Computers and calculators are tools of mathematicians, and students will be given opportunities to select and use the particular applications that may be helpful to them as they search for their own solutions to problems.
- *English As a Second Language (ESL)*: Appropriate accommodations in teaching, learning, and evaluation strategies will be made to help ESL students gain proficiency in English, since students taking ESL at the secondary level have limited time in which to develop this proficiency. Teachers will ensure that reading levels are appropriate to students' abilities and will strive for clarity in the use of mathematical terminology.
- *Career Education*: Expectations in the English program include many opportunities for students to apply their language skills to work-related situations, to explore educational and career options, and to become self-directed learners. Regardless of their post secondary destination, all students need to realize that literacy skills are employability skills.
- *Cooperative Education and Other Workplace Experiences:* The knowledge and skills students acquire in this courses will assist them in their senior level cooperative-education and work-experience placements related to this course. General information about cooperative education courses can be found at http://www.edu.gov.on.ca/eng/document/curricul/secondary/coop/cooped.pdf

4. Learning Skills

Learning Skills are skills and habits are essential to success in school and in the workplace. The Learning Skills evaluated are: Works Independently, Teamwork, Organization, Work Habits/Homework, Initiative. Teachers report achievement on the five Learning Skills using letter symbols: E = Excellent, G = Good, S = Satisfactory, N = Needs Improvement.

Learning Skills clearly affect levels of achievement, but they are *not* part of the evaluation of achievement and are not included in the midterm mark or final course mark.

5. Academic Honesty: Cheating and Plagiarism

Students are expected to submit only their own original work on evaluations done in class or out of class. Plagiarism the passing off the ideas or writings of another as one's own. Cases of academic dishonesty (cheating and/or plagiarism) will be dealt with on a case-by-case basis, but each case will involve an investigation, communication with the student and his/her parent/guardian, and a mark of zero for the plagiarized work. Whether the student has an opportunity to demonstrate his/her learning in another assignment will be at the discretion of the teacher and/or Principal.

6. Teaching Strategies

Teachers use a variety of teaching strategies to maximize student learning. The following teaching strategies may be used in this course:

- *Direct Instruction* is highly teacher-directed. This strategy includes methods such as lecture, didactic questioning, explicit teaching, practice and drill, and demonstrations.
- *Indirect Instruction* is mainly student-centered. Indirect Instruction includes inquiry, induction, problem solving, decision making, and discovery.
- *Interactive Instruction* relies heavily on discussion and sharing among participants. Interactive instruction may include total class discussions, small group discussions or projects, or student pairs or triads working on assignments together.
- *Experiential Learning* is inductive, learner centered, and activity oriented. In Experiential Learning, students participate in an activity; critically look back on the activity to clarify learnings and feelings; draw useful insights from such analysis; and/or put learnings to work in new situations..
- *Independent Study* refers to the range of instructional methods which foster the development of individual student initiative, self-reliance, and self-improvement. The focus is on planned independent study by students under the guidance or supervision of a classroom teacher.

7. Assessment and Evaluation Strategies

Assessment and Evaluation of Student Achievement

The primary purpose of assessment and evaluation is to improve student learning. Assessment is the process of gathering information from assignments, demonstrations, projects, performances, and tests that accurately reflects how well a student is achieving the curriculum expectations in a course. As part of assessment, teachers provide students with feedback that guides their efforts towards improvement.

Evaluation refers to the process of judging the quality of student work on the basis of established criteria, and assigning a value to represent that quality. In Ontario secondary schools, the value assigned will be in the form of a percentage grade.

- In this course, the following evaluation strategies may be used: In-class activities, assignments, case studies, tests, quizzes, investigations, technology-based inquiry, summative evaluation, and a culminating project

8. Achievement Chart

The achievement chart provides a standard, province-wide method for teachers to use in assessing and evaluating their students' achievement. Students are evaluated according to the major categories or strands in each course. Ministry curriculum documents provide detailed description of student achievement levels.

In this course, students are evaluated in four strands, according to the weightings shown:

Knowledge/Understanding	Thinking/Inquiry	Communications	Application
30%	20%	20%	30%

9. 70% Mark on Course Work

- Students need to demonstrate achievement of all the overall expectations of the course. 70% of the final mark in the course will be based on work done prior to the culminating activities. Evaluations that are late, missing, and/or incomplete will affect a student's 70% grade. See FHCI Evaluation Policy as printed in the Student Agenda Book for information about late, missed, and/or incomplete assignments.

10. 30% Grade Based on Course Culminating Activities

- All students must take part in the culminating activities for each course at every grade and level of study. The steps to follow when a student is absent from one or more culminating activities are included in the FHCI evaluation policy as printed in the Student Agenda Book.
- Culminating activities that occur in class are held within the last three weeks of classes. Culminating activities that are formal examinations occur within the last nine days of the semester

SUMMATIVE PROJECT	10%	-	Final Report
FINAL EXAM	20%	-	Final summative exam

11. Determining Marks for the Midterm

This grade will be based on the evaluations that have been conducted to the midterm point in the course. Some of the Overall Expectations, categories/strands, and units will not have been addressed by the midterm, and the students' grades will most likely change when the students' entire work is evaluated by the end of the course.

12. Determining the Mark for the Final Report Card

The mark for the final will report card will be the sum of the 70% mark and the 30% mark.

13. Missed tests/quizzes dates

If a student is legitimately absent for a test or quiz, upon return to school, they must have a doctor's note or a note from their parent or guardian stating the reason for their absence. At that time, and at the convenience of the teacher, the student will write a makeup test. If a student does not have a valid reason for his/her absence**, a mark of zero will be given**.
Every effort will be made by the subject teacher to notify students well in advance of scheduled test dates.

Definition of Legitimate Absence

- Illness with a doctor's note
- Death in the family
- Medical appointment (Advance notice required)
- Religious reasons (Advance notice required)
- School authorized field trip (Advance notice required)
- Court appearances (Advance notice required)

Teacher Contact: 416-393-1860 Ext. 20080

The following is a list of topics to be covered in each unit. Work assigned in class may differ from what is listed here. These textbook references and suggested exercises are for students to anticipate upcoming topics or to keep up should they miss class.

UNIT 1: Making Sense of the Data

1. VISUAL REPRESENTATIONS OF DATA
   (Sec 1.1) Constructing and Interpreting Visual Displays of Data
   Exercises: Page 11 #2, 3, 6, 7, 8, 16

2. ABSOLUTE & RELATIVE DATA
   Sheet: Demographic Data

3. HISTOGRAMS
   (Sec 3.1) Graphical Displays of Information
   Exercises: Page 146 #4, 5, 6, 8, 9

4. MEASURES OF CENTRAL TENDENCY & BOX PLOTS
   (Sec 3.2) Measures of Central Tendency
   Exercises: Page 159 #4, 5, 6, 10 - 12
   (Sec 3.3) Measures of Spread
   Exercises: Page 168 #1 - 2

5. MEASURES OF SPREAD
   (Sec 3.3) Measures of Spread
   Exercises:
   Page 168 #3 - 5, 7

6. NORMAL DISTRIBUTION
   (Sec 3.4) Normal Distribution
   Exercises:
   Page 176 #3 – 6, 9, 10

   (Sec 3.5) Applying the Normal Distribution: Z-Scores
   Exercises: Page 186 #1, 4, 6 – 12, 15

7. Test #1

UNIT 2: Trends and Technology

1. MATRICES
   (Sec 6.3) Organizing Information with Matrices
   Exercises: Page 353 #1 - 4, 8, 9
   (Sec 6.4) Matrix Multiplication
   Exercises: Page 369 #1 – 6, 8, 10 - 15

2. REVIEW OF SLOPE and EQUATIONS OF LINES

3. SCATTER PLOTS & MEDIAN-MEDIAN LINE
   (Sec 1.3) The Power of Visualizing Data
   Exercises: Page 37 #6 - 9

4. LINES OF BEST FIT & RESIDUALS
   (Sec 1.4) Trends Using Technology
   Exercises: Page 51 #3 - 8, 13

5. Test #2

INDEPENDENT READING

Posing Questions and Collecting Data

1. (Sec 2.1) Developing a Thesis Exercises: Page 81 #4, 5, 6 – 13

2. (Sec 2.2) Characteristics of Data Exercises: Page 89 #3, 4, 5, 7

Quiz #1:

_____

3. (Sec 2.3) Collecting Samples Exercises: Page 99 #2, 5, 9, 10, 11

4. (Sec 2.4) Creating Questions Exercises: Page 105 #1, 2, 5, 8, 11

Quiz #2:

_____

5. (Sec 2.5) Avoiding Bias Exercises: Page 114 #3, 5, 7, 9, 11

6. (Sec 2.6) Secondary Sources Exercises: Page 123 #1, 5, 7, 8

Quiz #3:

_____

UNIT 3: Dealing with Uncertainty – Introduction to Probability

1. (Sec 4.2) Theoretical Probability
   Exercises: Page 218 #1, 2, 3, 5, 6, 10, 12
2. (Sec 4.3) Finding Probability Using Sets
   Exercises: Page 228 #1 - 8,11,12,14,15
3. (Sec 4.4) Conditional Probability
   Exercises Page 235 #2, 4, 5, 6, 9, 11
4. (Sec 4.5) Finding Probability Using Tree Diagrams and Outcome Tables
   Exercises: Page 245 #5, 8, 9, 10
5. (Sec 4.6) Counting Techniques and Probability Strategies – Permutations
   Exercises:
   Day 1: Page 255 #1 – 6, 8
   Day 2: Page 256 #7, 9 – 12, 15
6. (Sec 4.7) Counting Techniques and Probability Strategies – Combinations
   Exercises: Page 262 #1 – 3, 5, 6, 7
7. (Sec 4.7) Probability and Odds
   Exercises: Page 262 #4, 8, 9, 11 – 15
8. Test #3

UNIT 4: Probability Distributions and Predictions

1. (Sec 5.1) Probability Distributions and Expected Value
   Exercises: Page 277 #4 – 7, 9, 12
2. (Sec 5.2) Pascal's Triangle
   Exercises: Page 289 #1, 2, 7, 8, 10, 11
3. (Sec 5.2) The Binomial Theorem
   Exercises: Page 289 #3–5,13–15,20,21
4. (Sec 5.3) Binomial Distributions
   Exercises: Page 299 #1 - 4, 6, 8, 12, 13
5. (Sec 5.3) Binomial Distribution and Expected Value
   Exercises: Page 300 #7, 9, 10, 11, 16
6. (Sec 5.4) Probability Using Normal Distribution
   Exercises: Page 312 #5 – 12
7. Test #4