**EAST YORK COLLEGIATE INSTITUTE**

**MCR 3U Course Outline 2013-2014**

This Course Outline is based upon the Ministry of Education and Training Ontario Curriculum for Grade 11 University Mathematics as per the revised document of 2006.

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| ***Board:*** | Toronto District School Board |
| ***School:*** | East York Collegiate Institute |
| ***Curriculum Leader:*** | R.Singh |
| ***Developing Teachers:*** | L.Lahtinen, G. Kyritsis |
| ***Date of Revision:*** | June 2012 |
| ***Course Title:*** | Functions, Grade 11 University Preparation |
| ***Grade:*** | 11 |
| ***Code:*** | MCR 3U |
| ***Credit Value:*** | 1.0 |
| ***Pre-requisite:*** | Principles of Mathematics, Grade 10, Academic |
| ***Textbook:*** | Functions and Relations 11, Addison-Wesley, 2002 |
| ***Resources:*** | Functions 11, McGraw-Hill, 2008  Functions 11, Nelson, 2007  Mathematics 11, McGraw-Hill Ryerson, 2001  Access to Graphing Calculators, Geometer’s Sketchpad & Fathom |
| ***Supplementary Resources:*** | Handouts, Exemplars, etc. |

**Course Description**

This course introduces the mathematical concept of the function by extending students’ experiences with linear and quadratic relations. Students will investigate properties of discrete and continuous functions, including trigonometric and exponential functions; represent functions numerically, algebraically, and graphically; solve problems involving applications of functions; and develop facility in determining equivalent algebraic expressions. Students will reason mathematically and communicate their thinking as they solve multi-step problems. Throughout the course, students will engage in the following processes: Problem Solving, Reasoning and Proving, Reflecting, Selecting Tools and Computational Strategies, Connecting, Representing, Communicating.

**Strands**

Quadratic Functions (32 periods) Exponential Functions (17 periods) Discrete Functions (22 periods) Trigonometric Functions (33 periods) General Functions (10 periods)

**Program Planning Considerations**

***Exceptional Students****:* Additional time will be allowed for tests. Additional accommodations will be provided in consultation with the Guidance, Special Education and ESL departments.

***Technology:*** Manipulatives, Graphing Calculators, and Geometer’s Sketchpad will be utilized for hands-on and technology-related applications.

***Career Education:*** Links to related fields will be established throughout the course. ***Co-operative Education****:* These will be provided in association with Guidance Department. ***Mathematics Anxiety****:* Attention will be addressed according to the following:

• Cultural perspectives

• Positive reinforcements

• Variety of assessment techniques

• Group structures

• Consideration for Learning Styles

**Learning Skills**

Assessment of the learning skills will be done on an ongoing basis throughout the academic year by observations of students at work, checklists and interviews. This will include:

• Classwork/homework (Work habits, homework and organization)

• Completed work and seeking assistance (Organization and initiative)

• Persistence and independence at tasks (Working independently and initiative)

• Extension of task (Organization and initiative**)**

• Achievement of group goals (Team work)

**Assessment Strategies**

A variety of teaching/assessment strategies to address students’ needs will be used during the school year. Formative assessments will be ongoing through out the academic year. These may include:

• Diagnostic assessment

• Formative assessment

• Performance assessment

• Portfolio assessment

• Rubrics

• Checklists

**Term Summative Evaluations (70% Term Work)**

• Tests, quizzes, tasks and other forms of term summative evaluations will occur throughout the academic year at the end of units of work as outlined in the accompanying course outline.

• Students will be provided with reasonable opportunities to master skills relating to the achievement of the curriculum

expectations before assessment and evaluation occurs.

• Major evaluations will be announced at least one week in advance.

• Accommodations will be made for school activities, statutory holidays, religious days, cultural days, sports events and other occurrences that may impact on any scheduled evaluation. It is the student’s responsibility to notify teachers of such absences in advance and to make up missed work.

• Absence on the day of an evaluation must be documented. If a student must miss an evaluation, s/he is expected to:

a) see the teacher before the absence to arrange for an alternative date to make up the evaluation; or

b) in case of illness or unexpected absence, present a note to the teacher, signed by a parent or guardian, immediately upon their return to explain the absence. An alternate evaluation will then be scheduled at a mutually convenient time.

• The East York Late Policy applies to all assignments and evaluations. See your Agenda book.

• Cheating will not be tolerated in any form and will be dealt with appropriately

**Final Mark Calculation**

Calculation of the Term Mark will be based upon the ***Categories*** of the ***Achievement Chart***. This chart is meant to assist teachers in planning instruction and learning activities for the achievement of the curriculum expectations. It is also used in designing assessment and evaluation tools and in providing feedback to students. Each mathematical topic will contain each category in the chart due to the integrated nature of the discipline in mathematics. Final marks will be calculated as follows:

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| **Term Work:** |  | **70%** | ***Levels of Achievement:*** |
| Knowledge and Understanding: | 40% |  | Level 1: 50 – 59% |
| Application: | 30% |  | Level 2: 60 – 69% |
| Thinking and Inquiry: | 20% |  | Level 3: 70 – 79% |
| Communication: | 10% |  | Level 4: 80 – 100% |
| **Final Summative Evaluation(s):**  **Reporting** |  | **30%(25% final exam, 5% project)** |  |
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**Communication**

***Access to extra help and mark records***. Students are encouraged to consult their teachers on a regular basis for extra help and guidance as it relates to improving their academic performance. Students are also expected to discuss strategies for improving their grades with their teachers. Students are expected to view their report cards as an indication of their current achievement and discuss with teachers for clarification.

***Communication with Parents/Guardians***. Comments pertaining to academic achievement and learning skills are placed on the report cards are primarily to provide feedback for parents/guardians as well as students. Parent/guardian nights can be used for one to one discussion. At times it may be necessary to contact parents/guardians by telephone to discuss a student’s performance. Parents/guardians are also encouraged to contact teachers as and when the need arises.

**EAST YORK COLLEGIATE INSTITUTE Mathematics Department**

**MCR 3U Daily Course Outline 2012-2013**

Text: **Mathematics 11 Nelson**

**Strand #1: Quadratic Functions (32 periods)**

Overall Expectations:

• To demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions;

• To determine the zeros and the maximum and minimum of a quadratic function, and solve problems involving quadratic functions, including problems arising from real-world applications.

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| **PER** | **TOPIC** | **SECTION** | **ASSIGNMENT** (p = page) |
| **UNIT #1: POLYNOMIALS and RATIONAL EXPRESSIONS** (12 periods) | | | |
| 1, 2 & 3 | Preview: Operations with Fractions & Monomials  Factoring Polynomials | Skills  p 78–82 | Exercises p 78 # 1–4 , p 80 1–8  p 83 # 1–7 + Additional Exercises |
| 4 & 5 | Operations with Polynomials (Distributive Law) | **2.1** (p 84) | Ex.2.1 (p 86) # 1–8, 14, 15 18–25, 30, 31 |
| 6 | Mini-test  Evaluating Rational Expressions | **2.2** (p 91) | Ex.2.2 (p 93) # 1–11 |
| 7 | Simplifying Rational Expressions | **2.3** (p 96) | Ex.2.3 (p 99) # 1–6, 8, 9, 11–14 |
| 8 | Multiplying/Dividing Rational Expressions | **2.4** (p 103) | Ex.2.4 (p 105) # 1–16 |
| 9 & 10 | Adding/Subtracting Rational Expressions | **2.6** (p 108)  **2.6** (p 112) | Ex.2.5 (p 109) # 1–10, 11, 13, 14, 15, 16  Ex.2.6 (p 114) # 1–7, 9, 11, 12, 14–19 |
| 11 | Review Exercises | p 122 | Exercises p 122 # 1–18 |
| 12 | TEST #1 |  |  |
| **UNIT #2: QUADRATIC EQUATIONS & FUNCTIONS** (20 periods) | | | |
| 1 & 2 | Preview: Number System, Multiplying Radicals  Preview: Quadratic Functions, Intercepts and Zeros | p 200+204 p 198+201 | Exercises p 201 # 1–3 + p 205 # 1–3  Exercises p 200 # 1–3 + p 203 # 1–3 |
| 3 & 4 | Solving Quadratic Equations by Factoring | **4.2** (p 212) | Ex.4.2 (p 218) # 2 + Handout Exs. # 1–22 |
| 5 & 6 | Solving Quadr. Equations using Quadratic Formula | **4.3** (p 222) | Ex.4.3 (p 226) # 7,9,10,15 + Handout Ex. #50-61 |
| 7 | Nature of Roots of a Quadratic Equation | **4.2** (p 212) | Ex.4.2 (p 220) # 17© + Handout Exs. # 23–45 |
| 8 | Determine a Quadratic Equation given its Real Roots | Handout | Handout Exercises |
| 9 | Solving Quadr. Equations by Completing the Square | Handout | Handout Exs.# 23–26 |
| 10 | Review | p. 241 | Handout Exercises |
| 11 | TEST #2 |  |  |
| 12 & 13 | Completing the Square in a Quadratic Function  Graphs of Quadratic Functions  Maximum/Minimum Value of a Quadratic Function  Applications of Maximum/Minimum Values | **4.1** (p 206) | Ex.4.1 (p 210) # 3, 4, 5, 7  Ex.4.1 (p 210) # 8  Ex.4.1 (p 210) # 1, 2, 6, 9, 10  Ex.4.1 (p 211) # 13, 14 + Ex.4.2 (p 220) # 15 |
| 14 | Solving Quadratic Equations by Graphing | **4.2** (p 212) | Ex.4.2 (p 218) # 1, 6, 7 (by hand & TI-83) |
| 15 | TEST #3 |  |  |
| 16 | Applications of Linear & Quadratic Functions  (using Function Notation) | Handout | Handout Exercises |
| 17 | Solving Linear-Quadratic Systems Algebraically |  | Handout Exercises |
| 18 | Solving Linear-Quadratic Systems by Graphing |  | Handout Exercises (by hand & TI-83) |
| 19 | Review Exercises | p 241 | Exercises p 241 # 1–9 |
| 20 | TEST #4 |  |  |

**Strand #2: Exponential Functions (17 periods)**

Overall Expectations:

• To evaluate powers with rational exponents, simplify expressions containing exponents, and describe properties of exponential functions represented in a variety of ways;

• To make connections between numeric, graphical, and algebraic representations of exponential functions;

• To identify and represent exponential functions, and solve problems involving exponential functions, including problems arising from real- world applications.

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| **UNIT #3: WORKING WITH POWERS - EXPONENT LAWS** (10 periods) | | | |
| 1 & 2 | Exponent Laws for Integer Exponents  Exp. Laws # 1–5: mult, divide, power, neg./zero exp | Skills p 3  Handout | Exercises p 5 # 1–5  Handout Exercises |
| 3 & 4 | Numerical Roots  Defining Rational Exponents  Exponent Law for Rational Exponents | Skills p 6  **1.5** (p 39) | Exercises p 7 # 1–2  Ex.1.5 (p 42) # 1–7, 11–13, 17  Handout Exercises |
| 5 | Applications of Working with Powers | **1.5** (p 42) | Ex.1.5 (p 43) # 8–10, 14–16, 18–21 |
| 6 | Working with Powers (all Exponent Laws) | **1.6** (p 47) | Ex.1.6 (p 50) # 1–8 |
| 7 & 8 | Solving Exponential Equations | **1.6** (p 47) | Ex.1.6 (p 51) # 9–13, 16, 17 + Handout Exercises |
| 9 | Review Exercises | p. 72 | Exercises p 42 #14-20 + Handout Exercises |
| 10 | TEST #5 |  |  |
| **1 & 2** | **Review for Cumulative Test (Units #1-3)** |  | **Handout Exercises** |
| **3** | **CUMULATIVE TEST** |  | ***End of Term 1*** |
| **UNIT #4: THE EXPONENTIAL FUNCTIONS** (7 periods) | | | |
| 1 | Investigating f(x) = bx and f(x) = a bx + c |  | Handout Exercises |
| 2 | Exponential Growth and Decay |  | Handout Exercises |
| 3 | Modelling Data Using the Exponential Function |  | Handout Exercises |
| 4 | Rates of Change of Exponential, Linear & Quadratic  Functions |  | Handout Exercises |
| 5 | Applications of Exponential Functions |  | Handout Exercises |
| 6 | Review |  |  |
| 7 | TEST #6 |  |  |

**Strand #3: Discrete Functions (22 periods)**

Overall Expectations:

• To demonstrate an understanding of recursive sequences, represent recursive sequences in a variety of ways, and make connections to

Pascal’s Triangle;

• To demonstrate an understanding of relationships involved in arithmetic and geometric sequences and series, and solve problems;

• To make connections between sequences, series, and financial applications, and solve problems involving compound interest and ordinary annuities.

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| **UNIT #5: SEQUENCES & SERIES** (15 periods) | | | |
| 1 & 2 | Preview: Patterns + Sequences  Linear Growth + Arithmetic Sequences | Skills p 7–8  **1.1** (p 9) | Patterns + Sequences: (p 7–8) # 1–6  Ex.1.1 (p 12) # 1, 2, 5, 6, 13–17  Applications: # 8–12 |
| 3 & 4 | Exponential Growth + Geometric Sequences | **1.2** (p 16) | Ex.1.2 (p 22) # 1,2, 3, 5, 7, 8, 20–26  Applications: # 4, 6, 9–15, 17, 18 |
| 5 & 6 | General Term of a Sequence | **1.3** (p 26) | Ex.1.3 (p 29) # 1–17, 22, 23, 26, 27  Applications: # 8–21, 24, 25 |
| 7 & 8 | Recursion Formulas | **1.4** (p 34) | Ex.1.4 (p 35) # 1–11 / # 12–17 |
| 9 | Pascal’s Triangle & Binomial Theorem; Fibonacci & Like Sequences | Handout | Handout Exercises |
| 10 & 11 | Sum of an Arithmetic Series | **1.7** (p 54) | Ex.1.7 (p 56) # 1–9, 12, 13 / 19–21, 24-26  Applications: #10, 11, 14, 15, 17, 18, 22 |
| 12 & 13 | Sum of a Geometric Series | **1.8** (p 60) | Ex.1.8 (p 61) # 1–7 / 9, 10, 15–17  Applications: #8, 11–14 |
| 14 | Review Exercises | p 70 | Exercises p 71 #1-13, 21-30 |
| 15 | TEST #7 |  |  |
| **UNIT #6: FINANCIAL MATHEMATICS** (7 periods) | | | |
| 1 & 2 | Annual Compound Interest: Amount + Present Value  Compound Interest: Amount + Present Value | **3.1** (p 135)  **3.2** (p 144) | Ex.3.1 (p 138) # 2,4,14,15,18,19,23–26,30–33  Ex.3.2 (p 146) # 2, 4–11 / # 13–19, 20–25 |
| 3 & 4 | Annuity: Amount | **3.3** (p 151) | Ex.3.3 (p 154) # 2, 4, 12–14 / # 15–26 |
| 5 | Annuity: Present Value | **3.4** (p 159) | Ex.3.4 (p 162) # 2, 4, 13–18, 20 |
| 6 | Review Exercises | p 192 | Exercises p 192 #1-21 |
| 7 | TEST #8 |  |  |

**Strand #4: Trigonometric Functions (33 periods)**

Overall Expectations:

• To determine the values of the trigonometric ratios for angles less than 360˚; prove simple trigonometric identities; and solve problems using the primary trigonometric ratios, the sine law, and the cosine law;

• To demonstrate an understanding of periodic relationships and sinusoidal functions, and make connections between the numeric, graphical,

and algebraic representations of sinusoidal functions;

• To identify and represent sinusoidal functions, and solve problems involving sinusoidal functions, including those arising from real-world applications.

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| **UNIT #7: TRIGONOMETRIC FUNCTIONS** (22 periods) | | | |
| 1 | Review: Trigonometric Ratios  & Solving Right Triangles | Skills p 246 | Exercises p 247 # 2-5 |
| 2 | Review: Sine Law / Solving Acute Triangles | Skills p 248 | Exercises p 249 # 3-6 |
| 3 | Review: Cosine Law / Solving Acute Triangles | Skills p 250 | Exercises p 252 # 1-7 |
| 4 | Sine + Cosine Law in Obtuse Triangles  (including the ambiguous case) | **5.2** (p 260) | Ex.5.2 (p 263) # 5, 8. 9, 10 + Handout Exs. |
| 5 & 6 | Applications of Solving Triangles | **5.2** (p 260) | Ex.5.2 (p 263) # 11–16 / # 17–24, (23, 24) |
| 7 | Review Exercises |  |  |
| 8 | TEST # 9 |  |  |
| 9 & 10 | Sine + Cosine of an Angle  Pythagorean Identity  Angles on Coordinate Axes  Solving (simple) Trigonometric Equations | **5.1** (p 253) | Ex.5.1 (p 257) # 1-4, 9, 10, 14-16 /  # 5–8, 11–13 |
| 11 | Angles in Standard Position / Coterminal Angles | **5.3** (p 268) | Ex.5.3 (p 270) # 1–12 |
| 12 & 13 | Sine, Cosine + Tangent of an Angle; CAST Rule; Solving (simple) Trig..Equations | **5.4** (p 272) | Ex.5.4 (p 278) # (1–7), 8–13 / # 17–25 |
| 14 | Sine, Cosine + Tangent of Special Angles | **5.5** (p 282) | Ex.5.5 (p 285) # 1–4, 6, 7, 9 |
| 15 | Trigonometric Angles of Acute Angles | Handout | Handout Exercises |
| 16 | Trigonometric Ratios of Any Angle | Handout | Handout Exercises |
| 17 | Review Exercises | p 315 | Exercises p 316 # 1–3, 8–14 |
| 18 | TEST #10 |  |  |
| 19 & 20 | Proving Trigonometric Identities (including reciprocal ratios) | **5.9** (p 307) | Ex.5.9 (p 308) # 1–16 + Handout Exs. |
| 21 | Review Exercises | Handout | Handout Exercises |
| 22 | TEST #11 |  |  |
| **UNIT #8: GRAPHS OF TRIGONOMETRIC FUNCTIONS (11 periods) [Sine, Cosine & Tangent Functions in DEGREE measure]**  **NOTE: Textbook exercises need to be converted to DEGREES. – Handouts needed.** | | | |
| 1 | Introduction to Periodic Functions | **6.1** (p 329) | [Ex.6.1 (p 331) # 1–7] |
| 2 | Graphs of Basic Sine/Cosine Functions [in degrees] | **6.2** (p 333) | [Ex.6.2 (p 336) # 1–8] |
| 3 & 4 | Amplitude, Vertical Displacement, Phase Shift | **6.3** (p 340) | [Ex.6.3 (p 347) # 1–7, 16, 17, 19] |
| 5 & 6 | Period & Combining Transformations | **6.4** (p 352) | [Ex.6.4 (p 357) # 1–14] |
| 7 | Graph of Basic Tangent Function [in degrees] | **6.6** (p 322) | [Ex.6.6 (p 375) #1-7, 10, 14] |
| 8 & 9 | Applications of Sinusoidal Functions | **6.5** (p 362) | [Ex.6.5 (p 366) # 1–16]  [Exercises p 389 # 5-7 + Tasks p 390 #1, 2] |
| 10 | Review Exercises | p 383 | [Exercises p 384 # 1–21] |
| 11 | TEST #12 |  |  |

**Strand #5: General Functions (10 periods)**

Overall Expectations:

• To demonstrate an understanding of functions, their representations, their inverses, and make connections between the algebraic and graphical representations of functions using transformations.

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| **UNIT #9: TRANSFORMATIONS OF FUNCTIONS (10 periods)** | | | |
| 1 | Tests for a Function: Vertical Line & Equation  Solving Linear Inequalities | Skills p 392  Skills p 394 | Exercises p 393 # 1–3  Exercises p 395 # 1–2 |
| 2 | Graphs of Linear, Quadratic, Radical & Absolute  Value Functions  Domain and Range of a Function | **7.1** (p 396) | Ex.7.1 (p 399) # 1–10 |
| 3 | Function Notation | **7.2** (p 401) | Ex.7.2 (p 404) # 1–6, 8–20, 20, 23, (24–26) |
| 4, 5 & 6 | Transforming Functions | **7.3** (p 409)  **7.4** (p 418) | Ex.7.3 (p 413) # 1, 2, 4–6, 9, 10, 15 / # 16, 18, 19,  20, 29, 31 **/** Ex.7.4 (p 419) # 1–7, 11–13, 21–23 |
| 7 & 8 | Inverse of a Function  Domain and Range of an Inverse Function | **7.5** (p 424) | Ex.7.5 (p 430) # 3, 4, 7, 8, 10, 15, 16, 17, 19 |
| 9 | Review Exercises | p 440 | Exercises p 440 # 1–21 |
| 10 | TEST #13 |  |  |
| **January Cumulative Review (Units #1-9) June Examination (30%)** | | | |