INSTITUTE OF CANADIAN EDUCATION

Course Title: Functions, Grade 11, University Preparation (MCR3U)

Course Name: Functions

Course Code: MCR3U

Grade: 11

Course Type: University Preparation

Credit Value: 1.0

Prerequisite: Principles of Mathematics, Grade 10, Academic (MPM2D)

Curriculum Policy Document: *The Ontario Curriculum, Mathematics, Grades 11 and 12*

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 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; investigate inverse functions; and develop facility in determining equivalent algebraic expressions. Students will reason mathematically and communicate their thinking as they solve multi-step problems.

Unit Overview

Unit	Unit Title	Unit Titles and Descriptions	Time Allocated
1	**Characteristics of Functions**	Students will investigate functions through tables, graphs, equations, and verbal descriptions. They will determine domain and range, analyze rates of change, and explore transformations of functions	22 Hours
2	**Exponential Functions**	Students will develop an understanding of exponential relationships and their properties. They will model real-world growth and decay situations and solve problems involving exponential equations.	22 Hours
3	**Discrete Functions and Financial Applications**	Students will investigate sequences, series, and financial applications such as simple and compound interest. They will model real-life situations using discrete functions.	22 Hours
4	**Trigonometric Functions**	Students will explore the sine, cosine, and tangent ratios and functions. They will analyze periodic behaviour and solve problems involving angles, triangles, and applications of trigonometry.	22 Hours
5	**Consolidation and Culminating Activities**	Students will consolidate learning across all units through review activities, problem-solving tasks, and preparation for the final evaluation.	19 Hours
Final Exam			3 Hours

OVERALL CURRICULUM EXPECTATIONS

Characteristics of Functions

• Demonstrate an understanding of functions, their representations, and their inverses, and make connections between the algebraic and graphical representations of functions using transformations;
• Determine the zeros and the maximum or minimum of a quadratic function, and solve problems involving quadratic functions, including problems arising from real-world applications;
• Demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions.

Exponential Functions

• Evaluate powers with rational exponents, simplify expressions containing exponents, and describe properties of exponential functions represented in a variety of ways;
• Make connections between the numeric, graphical, and algebraic representations of exponential functions;
• Identify and represent exponential functions, and solve problems involving exponential functions, including problems arising from real-world applications.

Discrete Functions

• Demonstrate an understanding of recursive sequences, represent recursive sequences in a variety of ways, and make connections to Pascal's triangle;
• Demonstrate an understanding of the relationships involved in arithmetic and geometric sequences and series, and solve related problems;
• Make connections between sequences, series, and financial applications, and solve problems involving compound interest and ordinary annuities.

Trigonometric Functions

• Determine the values of the trigonometric ratios for angles less than 360º; prove simple trigonometric identities; and solve problems using the primary trigonometric ratios, the sine law, and the cosine law;
• Demonstrate an understanding of periodic relationships and sinusoidal functions, and make connections between the numeric, graphical, and algebraic representations of sinusoidal functions;
• Identify and represent sinusoidal functions, and solve problems involving sinusoidal functions, including problems arising from real-world applications.

TEACHING AND LEARNING STRATEGIES

Students will engage in a variety of instructional and learning activities, including:

- **Presentations & Multimedia:** Teacher presentations, videos, examples, practice questions, simulations, and online activities to explain concepts and support understanding.
- **Participation Activities: S**even course-wide activities—*Teach the Teacher, Concept in Action, Spot the Error, Concept Connections, Take a Position, Claim/Support/Question,* and *Course Takeaways*—to promote engagement and reflection.
- **Diagrams & Visuals:** Visual representations to organize ideas, clarify concepts, and support learning.
- **Discussion Forums:** Written discussions that allow students to share ideas, provide feedback, and develop communication and critical-thinking skills.
- **Teacher–Student Discussions:** Video conferences and end-of-unit conversations provide opportunities for questions, problem-solving, feedback, and individualized support.
- **Practice & Application:** Practice questions, examples, and practical applications help students apply knowledge to different contexts.
- **Reflection & Lesson Notes:** Students summarize learning, reflect on key concepts, and connect theory to real-world situations.
- **Individual Activities & Assignments:** Students complete activities independently at their own pace to consolidate learning and demonstrate progress.
- **Ongoing Feedback & Support:** Teachers provide regular oral and written feedback and make reasonable accommodations and adjustments in accordance with students' IEPs and learning needs.

Assessment Strategies

Students will be provided with numerous and varied opportunities to demonstrate achievement of curriculum expectations across all four categories of the Achievement Chart. Assessment tools include assignments, quizzes, tests, investigations, projects, and teacher-student conferencing.

ASSESSMENT ACTIVITIES

- Homework & Assignments
- Conferences & Discussions
- Reflections
- Oral Presentations
- Tests & Exam

Final Grade

Component	Percentage
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

ATTENDANCE POLICY

Regular attendance and active engagement are important for student success. Attendance and participation are monitored through the school's Learning Management System (LMS).
All online credit courses at ICE are designed to meet or exceed the **minimum 110 hours of instructional time** required for a credit course.

Online instructional time and engagement are monitored through:

- **LMS Engagement:** Students are expected to log in regularly and actively participate in online learning activities. LMS activity records are used to monitor engagement.
- **Biweekly Check-Ins:** Students complete a brief check-in every two weeks to review their progress and engagement. Additional support may be provided when concerns are identified.
- **Post-Unit Quizzes:** Short formative quizzes are completed at the end of each unit to monitor student progress and pacing.
- **Discussion Forums:** Students participate in required unit discussions and peer activities. Participation is monitored based on completion and engagement.

Students are responsible for maintaining regular participation and completing required learning activities within the course schedule.

EVALUATION MODEL – 10% TOTAL ATTENDANCE AND ENGAGEMENT WEIGHT

Component	Weight	Quantifiable Metric	Criteria
Biweekly Check-In	3%	Completed every two weeks	Students completes the required check-in within the scheduled time frame.

Post-Unit Formative Quiz	4%	Completed after each unit	Student completes the formative quiz by the assigned deadline.
Discussion Forum Participation	3%	Required posts and responses	Student submits the required original response and completes assigned peer responses.

CONSIDERATIONS FOR PROGRAM PLANNING

Planning Programs for Students with Special Education Needs
All students can succeed and have unique learning needs. Instruction follows principles of **Universal Design for Learning (UDL)** and differentiated instruction. Where applicable, IEP accommodations are implemented in instruction, the learning environment, and assessment. Supports may include extended time, breaks, assistive technology, flexible deadlines, repeated access to learning materials, and alternative ways of demonstrating learning.

English Language Learners
Teachers consider the strengths and needs of English language learners and provide appropriate supports without changing curriculum expectations. Supports may include simplified instructional language, visuals and multimedia, opportunities to review material, extended time, bilingual dictionaries where appropriate, and feedback that supports academic English development.

Environmental Education
Environmental education is integrated where appropriate through real-world applications, examples, data, and discussions related to environmental issues. Students are encouraged to understand environmental challenges and consider responsible actions.

Equity and Inclusive Education
The course promotes an inclusive, respectful, and equitable learning environment. Learning materials and activities reflect diverse perspectives and experiences, and assessment practices are fair and free from cultural bias.

Financial Literacy Education
Where applicable, students develop financial literacy through real-world contexts such as budgeting, saving, interest, costs, and financial decision-making.

First Nations, Métis, and Inuit Education
Where appropriate to the curriculum, students engage with First Nations, Métis, and Inuit histories, cultures, perspectives, and contributions using accurate and respectful, Ministry-recommended resources.

Information and Communications Technology (ICT)
ICT is integrated throughout learning, instruction, assessment, and communication. Students use digital tools, multimedia, online resources, and productivity software while developing responsible digital citizenship, source evaluation, privacy awareness, and academic integrity.

Career Education
Students are encouraged to connect course learning with education, career, and life-planning opportunities. Teachers highlight applications of course knowledge to workplace, postsecondary, and career pathways.

Cooperative Education and Experiential Learning
Where appropriate, students may connect classroom learning to experiential opportunities such as job shadowing, work experience, or cooperative education.

Health and Safety
Students are encouraged to maintain safe and healthy learning practices, including appropriate ergonomics, screen-time management, regular breaks, and respectful online behaviour. Health and safety expectations are reinforced throughout the course.

Accommodations
Accommodations are determined through consultation with the student, parent/guardian, teachers, administration, and relevant educational assessment information. They may include:

- **Instructional:** varied teaching strategies, step-by-step instructions, organizers, technology, and multimedia.
- **Environmental:** appropriate seating, lighting, and learning conditions.
- **Assessment:** additional time, alternative response formats, oral responses, or other IEP-based supports.
- **Additional Supports:** advance access to reading materials, flexible reading/writing options, note-taking assistance, and enrichment opportunities.

Required Software, Equipment, and Textbooks

Required Textbooks and Resources

- Ontario Grade 11 Functions textbook aligned with *The Ontario Curriculum*
- Teacher-provided worksheets and practice problems

Digital Resources and Software

- Google Drive or equivalent platform
- Internet access for research and online tools
- Microsoft Office Suite or equivalent
- Graphing calculators and online graphing tools (e.g., Desmos)

Teacher Considerations

- Use of assistive technology where appropriate
- Flexible formats for demonstrating learning
- Accommodations and modifications aligned with IEPs
- Emphasis on mathematical reasoning and accuracy

Tips for Success

Welcome to **MCR3U: Functions**!
To succeed in this course:

- Check announcements and calendars regularly
- Practise problems consistently
- Ask questions early
- Use graphing tools to visualize functions
- Review feedback and correct mistakes
- Plan **1–2 hours of focused study per day**

Staying organized and practising regularly will help you succeed in mathematics and prepare you for advanced math courses and postsecondary pathways.