



Ontario eSecondary School Course Outline 2026-2027

Ministry of Education Course Title: Functions and Applications, University Preparation	
Ministry Course Code: MCR3U	
Course Type: University Preparation	
Grade: 11	
Credit Value: 1.0	
Prerequisite(s): Principles of Mathematics, Grade 10 (MPM2D)	
Department: Mathematics	
Course developed by: Andrew Lee	Date: September 10, 2018 Update: February 20, 2023 Revised: August 1, 2026
Length: One Semester	Hours: 110
This course has been developed based on the following Ministry documents: 1. <i>The Ontario Curriculum, Grades 11 and 12 Mathematics, Revised 2007</i>	

COURSE DESCRIPTION/RATIONALE

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.

OVERALL CURRICULUM EXPECTATIONS

Unit 1

By the end of this course, students will:

- Demonstrate an understanding of functions, their representations, and their inverses, reciprocals and make connections between the algebraic and graphical representations of functions using transformations;

Unit 2

By the end of this course, students will:

- Demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions.

Unit 3

By the end of this course, students will:

- 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

Unit 4

By the end of this course, students will:

- 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.

Unit 5

By the end of this course, students will:

- 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;

Unit 6

By the end of this course, students will:

- 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,

Unit 7

By the end of this course, students will:

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

COURSE CONTENT

<i>Unit</i>	<i>Length</i>
Unit 1: Characteristics of Functions	11 hours
Unit 2: Rational Functions	18 hours
Unit 3: Quadratic Functions	11 hours
Unit 4: Exponential Functions	15 hours
Unit 5: Trigonometric Functions Part 1	18 hours
Unit 6: Trigonometric Functions Part 2	18 hours
Unit 7: Sequence and Series, and Financial Applications	16 hours
Final Exam	3 hours
Total	110 Hours

UNIT DESCRIPTIONS

UNIT 1, 2, 3: CHARACTERISTICS OF FUNCTIONS

Students will explore what the difference between a function and a relation is. They will learn how to express the details of a function such as domain and range. They will learn to apply these terms on different functions such as linear, quadratic, and radical. They will also learn how to determine the numeric or graphical representation of the inverse of a linear or quadratic function, given the numeric, graphical, or algebraic representation of the function.

UNIT 4: EXPONENTIAL FUNCTIONS

Students will learn how to express an exponential function. They will investigate it using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies that they used to express functions that they learned in the past. Students will be expected to be able to compare exponential functions with the functions they learned in the past. They will explore different types of exponential functions and make connection through graphing and transformation, also identify exponential functions. An emphasis will be made to expose students to real world applications of growth and decay.

UNIT 5 AND 6: TRIGONOMETRIC FUNCTIONS

Students will extend their knowledge about trigonometric functions through describing key properties (e.g., cycle, amplitude, period) of periodic functions arising from real-world applications, given a numeric or graphical representation and making connections between the sine and cosine function and the unit circle with or without technology. They will pose problems involving right triangles and oblique triangles in two-dimensional settings/three-dimensional settings, and solve these and other such problems using the primary trigonometric ratios, the cosine law, and the sine law.

UNIT 7: DISCRETE FUNCTIONS AND FINANCIAL APPLICATIONS

Students will expand what they learned in patterning and acquire new skills on how to express sequences and patterns. There is an emphasis made on financial applications in this section based on simple investments and investments in a compound period.

TEACHING AND LEARNING STRATEGIES

The students will experience a variety of activities:

Participation activities are seven standardized, course-wide prompts (Teach the Teacher, Concept in Action, Spot the Error, Concept Connections, Take a Position, Claim/Support/Question, and a culminating Course Takeaways video) embedded at set points throughout the course. They build metacognitive engagement with unit concepts and contribute to the course's participation grade.

Presentations with embedded videos are utilized to outline concepts, explain theory with the use of examples and practice questions, and incorporate multi-media opportunities for students to learn more (e.g. online simulations, quizzes, etc.)

Diagrams are visual representations of ideas and concepts. They provide another perspective to organize ideas. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

Discussion forums are opportunities for students to express their ideas in written form and share these ideas with their peers. Students can also share feedback that builds upon the ideas of others. In turn, students have an opportunity to leverage one another's understanding and critical thinking to develop deeper understanding.

Discussions with the instructor are facilitated through video conferencing with their subject teacher, concerning the concepts and skills being studied. This enables two-way communication between the student and the instructor, to share ideas as well ask questions in dialogue. This also helps to build a relationship between the student and instructor.

End of unit conversations are opportunities for students to express their ideas, problem solving, and thought processes with a teacher who provides immediate feedback.

Practice questions are an opportunity for students to further apply their understanding and knowledge in a variety of contexts and scenarios with analysis and critical thinking to deepen their understanding.

Reflection is an opportunity for students to look back at concepts and theories with new eyes, to relate theory to practice, and to align learning with their own values and beliefs.

Lesson notes are an opportunity for students to highlight key concepts and summarize their learning in their own words, which helps to consolidate conceptual understanding.

Practical extension and application of knowledge are integrated throughout each lesson through examples. The goal is to help students to make connections between what they learn in the classroom and how they understand and relate to the world around them and their own lives. The goal is to make learning come alive as a dynamic opportunity for students to be more aware that the course learning is all around them and enable them to create more meaning in their lives.

Individual activities/assignments the assessments are completed individually at a student's own pace and are intended to expand and consolidate the learning in each lesson. Individual activities allow the teacher to accommodate interests and needs and to assess the progress of individual students. For this reason, students are encouraged to discuss IEPs (Individual Education Plans) with their teacher and to ask to modify assessments if they have a unique interest that they feel could be pursued in the assessment. The teacher plays an important role in supporting these activities by providing ongoing feedback to students, both orally and in writing.

ASSESSMENT, EVALUATION, AND REPORTING

Assessment: The process of gathering information that accurately reflects how well a student is achieving the identified curriculum expectations. Teachers provide students with descriptive feedback that guides their efforts towards improved performance.

Evaluation: Assessment of Learning focuses on Evaluation which is the process of making a judgement about the quality of student work on the basis of established criteria over a limited, reasonable period of time.

Reporting: Involves communicating student achievement of the curriculum expectations and Learning Skills and Work Habits in the form of marks and comments as determined by the teacher's use of professional judgement.

Assessment & Evaluation at OES: Triangulation of Learning

In alignment with the Ontario Ministry of Education's *Growing Success* policy, student achievement across all high school courses at Ontario eSecondary School (OES) is evaluated through the **triangulation of evidence: observations, conversations, and student products**.

OES courses incorporate each of these evidence sources in a variety of ways to provide every student with equitable opportunities to demonstrate their learning:

- **Observations:** Collected through video recordings, interactive digital tools, learning logs, and synchronous task demonstrations.
- **Conversations:** Gathered via teacher-student conferences, oral defenses, virtual check-ins, and reflective feedback dialogues.
- **Products:** Demonstrated through major projects, essays, lab reports, performance tasks, and final assessments.

By evaluating a balanced variety of evidence, OES teachers apply professional judgment to ensure accurate, fair, and comprehensive assessment of each student's progress.

STRATEGIES FOR ASSESSMENT

Assessment practices can nurture students' sense of progress and competency and information instruction. Many diagnostic tools, e.g. checklists and inventories, are used at regular intervals throughout the units to encourage students' understanding of their current status as learners and to provide frequent and timely reviews of their progress. Assessment of student acquisition of listening and talking, reading and viewing and writing skills also occurs regularly through unobtrusive teacher observation and conferencing.

Units conclude with performance tasks, e.g., interviews and from essays that build towards and prepare students for the end-of-course culminating task in Unit Five. Teachers are encouraged to share goals with students early in the course and to connect unit learning experiences frequently and explicitly with big ideas, overall expectations, and performance tasks, i.e. check bricks; teacher-adapted generic rubrics available in many sources, including the *Ontario Secondary School Literacy Course (OSSLC) Profile*, so that they are more task-specific. The teacher might ask: "What does the criteria look like for this particular task?" Or "What does limited effectiveness look like?" The teacher could involve students in the discussion, modification, or creation of rubrics, and teach students to use rubrics as a learning tool that can support the writing process and practice.

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ASSESSMENT ACTIVITIES

- ☐ Homework assignments
- ☐ Individual conference meetings
- ☐ Discussion Forums
- ☐ Reflections
- ☐ Oral presentations
- ☐ Tests & Exam
- ☐ Evaluations

EVALUATION

The final grade will be determined as follows:

- ☐ 65% of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.
- ☐ 25% of the grade will be based on a final evaluation administered at the end of the course. This evaluation will be based on a final written examination, comprehensive of the course. The final evaluation is an opportunity for the student to demonstrate comprehensive achievement of the overall expectations for the course.
- ☐ 10% of the grade will be based on the student's attendance and participation throughout the course, assessed according to Ministry criteria.

(*Growing Success: Assessment, Evaluation and Reporting in Ontario Schools*. Ontario Ministry of Education Publication, 2010 p.41)



TERM WORK EVALUATIONS (65%)

Evaluation Item	Description	Category	Weight
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Unit 1 Quiz	Each unit has a short quiz on material covered up to the quiz.	K,A	13
Unit 1 Unit Test	Unit tests are based on curriculum expectations and cover the entirety of each unit	K,T,C,A	
Unit 1 End of Unit Conversation	Unit reflection happens at the end of each unit for both student and teacher to reflect on their process and understanding in the unit. Students will meet with their teacher for an observation and conversation.	T,C	
Unit 2 Quiz	Each unit has a short quiz on material covered up to the quiz.	K,A	13
Unit 2 Unit Test	Unit tests are based on curriculum expectations and cover the entirety of each unit	K,T,C,A	
Unit 2 End of Unit Conversation	Unit reflection happens at the end of each unit for both student and teacher to reflect on their process and understanding in the unit. Students will meet with their teacher for an observation and conversation.	T,C	
Unit 3 Quiz	Each unit has a short quiz on material covered up to the quiz.	K,A	13
Unit 3 Unit Test	Unit tests are based on curriculum expectations and cover the entirety of each unit	K,T,C,A	
Unit 3 End of Unit Conversation	Unit reflection happens at the end of each unit for both student and teacher to reflect on their process and understanding in the unit. Students will meet with their teacher for an observation and conversation.	T,C	
Unit 4 Quiz	Each unit has a short quiz on material covered up to the quiz.	K,A	13
Unit 4 Unit Test	Unit tests are based on curriculum expectations and cover the entirety of each unit	K,T,C,A	
Unit 4 End of Unit Conversation	Unit reflection happens at the end of each unit for both student and teacher to reflect on their process and understanding in the unit. Students will meet with their teacher for an observation and conversation.	T,C	
Unit 5 Quiz	Each unit has a short quiz on material covered up to the quiz.	K,A	13
Unit 5 Unit Test	Unit tests are based on curriculum expectations and cover the entirety of each unit	K,T,C,A	

FINAL EVALUATIONS (25%)

Evaluation Item	Description	Category	Weight
Final Exam	A final, written examination, covering all curriculum expectations for the course.	K,I,C,A	25

ATTENDANCE AND PARTICIPATION (10%)

Evaluation Item	Description	Category	Weight
Attendance	Assessed according to the Ministry's attendance criteria (Growing Success, September 2026 update), based on the proportion of unexcused absences over the course.		5
Participation	Assessed according to the Ministry's participation criteria (Growing Success, September 2026 update), based on engagement in class discussions and activities throughout the course, including the standardized participation prompts (see Teaching and Learning Strategies).		5

AFL/AAL/AOL Tracking sheet:

Units 1-7

AAL	AFL	AOL
-Handout Solutions	-Lesson Notes -Discussion Forum Post 2.4 Unit 2 Discussion Forum (AFL): Observation 5.3 Unit 5 Discussion Forum (AFL): Observation	-Quiz -Unit Test -End of unit discussion 2.7 End of Unit Conversation (AOL): Conversation 5.9 End of Unit Conversation (AOL)

Unit 8: Final Assessments

AOL
-Final Exam

CONSIDERATION FOR PROGRAM PLANNING

PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

OES teachers are the key educators of students with special education needs and have a responsibility to help all students learn. Program planning for students with special education needs is guided by the principles set out in *Learning for All: A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12* (2013): all students can succeed; each student has their own unique patterns of learning; successful instructional practices are founded on evidence-based research, tempered by experience; and universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Where a student has an Individual Education Plan (IEP), the accommodations identified in the IEP — instructional, environmental, and assessment — are implemented within the course, and the online learning environment is adapted accordingly. The asynchronous structure of OES courses provides built-in flexibility that supports many common accommodations, including extended time for assignments and assessments, breaks as needed, access to assistive technology, and the ability to review instructional material multiple times.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

Ontario schools have some of the most linguistically diverse student populations in the world, and OES serves English language learners across Ontario and internationally. English language learners may be Canadian-born or newcomers; they may have experience of highly sophisticated educational systems or may have come from regions where access to formal schooling was limited. In planning this course, teachers consider the strengths and needs of English language learners and provide appropriate adaptations consistent with *English Language Learners / ESL and ELD Programs and Services: Policies and Procedures for Ontario Elementary and Secondary Schools, Kindergarten to Grade 12* (2007). Supports within the online environment include modification of instructional language without modification of curriculum expectations, use of visual and multimedia supports, opportunities to replay and review lesson content, extended time where appropriate, and teacher feedback that models academic English. Assessment accommodations, such as granting additional time and permitting the use of bilingual dictionaries, are provided where appropriate.

ENVIRONMENTAL EDUCATION

Consistent with *Acting Today, Shaping Tomorrow: A Policy Framework for Environmental Education in Ontario Schools* (2009) and *Environmental Education: Scope and Sequence of Expectations* (2017), environmental education is embedded across the curriculum rather than treated as a separate subject. Teachers help students acquire knowledge about the environment, develop skills to address environmental issues, and foster attitudes that motivate responsible environmental action. As an online school, OES also models environmental responsibility through paperless course delivery and the elimination of daily commuting. In this course, students apply mathematical processes to real data, including data related to environmental issues such as resource consumption, climate trends, and population growth, reinforcing the role of mathematics in understanding and addressing environmental questions.

EQUITY AND INCLUSIVE EDUCATION

This course is planned and delivered in accordance with Ontario's Equity and Inclusive Education Strategy (2009) and Policy/Program Memorandum No. 119, *Developing and Implementing Equity and Inclusive Education Policies in Ontario Schools* (2013). OES is committed to an inclusive learning environment in which all students feel welcomed, respected, and able to succeed, regardless of ancestry, culture, ethnicity, sex, gender identity, sexual orientation, disability, race, religion, or socio-economic status. In this course, teachers select learning materials that reflect the diversity of Ontario and the wider world, address bias in texts and resources where it arises, and ensure that assessment practices are fair and free of cultural assumptions. Because OES students learn from communities across Ontario, Quebec, and around the world, discussion activities and teacher feedback are moderated to maintain a respectful, harassment-free environment for all learners.

FINANCIAL LITERACY EDUCATION

In accordance with *A Sound Investment: Financial Literacy Education in Ontario Schools* (2010) and current Ministry direction on financial literacy, students are provided with opportunities to build the knowledge and skills needed to make informed financial decisions, understand their roles as consumers and citizens,

and think critically about the economic forces that affect their lives. OES also supports students in meeting the Ministry's financial literacy graduation requirement, as described in the OES School Course Calendar. In this course, students apply mathematical skills to financial contexts such as budgeting, saving, interest, and comparing costs, supporting the development of sound personal financial decision-making.

FIRST NATIONS, MÉTIS, AND INUIT EDUCATION

Program planning in this course aligns with the Ontario First Nation, Métis, and Inuit Education Policy Framework (2007), which supports improved outcomes for First Nations, Métis, and Inuit students and promotes awareness and understanding of Indigenous histories, cultures, perspectives, and contributions among all students. Where appropriate to the curriculum expectations, teachers incorporate Indigenous perspectives, authors, and content, and approach these topics with accuracy and respect, drawing on Ministry-recommended resources. All OES students benefit from opportunities to deepen their knowledge of the histories and contemporary realities of First Nations, Métis, and Inuit peoples, including the legacy of the residential school system and the Truth and Reconciliation Commission's Calls to Action related to education.

THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Information and communications technology (ICT) is integral to every OES course: instruction, learning activities, assessment, and teacher-student communication all take place through the school's learning management system. ICT tools — including multimedia lessons, digital texts, simulations, video conferencing for proctored assessments, and word-processing and productivity software — extend and enrich instruction and allow students to collect, organize, and present their learning in a range of formats. Teachers help students develop digital citizenship skills, including responsible and ethical use of technology, critical evaluation of online sources, protection of personal information, and academic integrity in digital environments, consistent with OES's Acceptable Use, Academic Honesty, and Artificial Intelligence policies as published in the School Course Calendar.

CAREER EDUCATION

Consistent with *Creating Pathways to Success: An Education and Career/Life Planning Program for Ontario Schools* (2013), teachers support students in answering the four questions at the centre of education and career/life planning: Who am I? What are my opportunities? Who do I want to become? What is my plan for achieving my goals? Expectations in this course include many opportunities for students to apply their skills to work-related situations, explore educational and career options, and become self-directed learners. OES guidance staff support students in course selection, postsecondary application planning (including OUAC, CEGEP, and international pathways), and the development of individual pathways plans. The problem-solving, reasoning, and quantitative skills developed in this course support pathways into science, technology, engineering, mathematics, finance, data analysis, skilled trades, and many other fields, and connections to these destinations are highlighted throughout the course.

COOPERATIVE EDUCATION AND OTHER FORMS OF EXPERIENTIAL LEARNING

Planned learning experiences in the community, including job shadowing, work experience, and cooperative education, provide students with opportunities to see the relevance of their classroom learning, explore careers of interest, and develop essential workplace skills consistent with *The Ontario Curriculum, Grades 11 and 12: Cooperative Education* (2018). Students may earn up to two cooperative education credits toward their compulsory credit requirements for the Ontario Secondary School Diploma. Students interested in experiential learning opportunities related to this course are encouraged to contact OES guidance staff to discuss options available to them.

HEALTH AND SAFETY

Although OES students learn remotely, health and safety remain integral considerations in program planning. Teachers model and promote safe and healthy practices for online learning, including sound ergonomics, balanced screen time, regular breaks, and strategies that support positive mental health and well-being. OES maintains a safe and respectful virtual learning environment consistent with the school's codes of conduct, bullying prevention expectations, and privacy practices as published in the School Course

Calendar, and students are provided with clear channels for reporting concerns to their teachers, guidance staff, or the Principal.

ACCOMMODATIONS

Accommodations will be based on meeting with parent, teachers, administration and external educational assessment report. The following three types of accommodations may be provided:

- ☐ **Instructional accommodations:** such as changes in teaching strategies, including styles of presentation, methods of organization, or use of technology and multimedia.
- ☐ **Environmental accommodations:** such as preferential seating or special lighting.
- ☐ **Assessment accommodations:** such as allowing additional time to complete tests or assignments or permitting oral responses to test questions.

Other examples of modifications and aids, which may be used in this course, are:

- ☐ Provide step-by-step instructions.
- ☐ Help students create organizers for planning writing tasks.
- ☐ Record key words on the board or overhead when students are expected to make their own notes.
- ☐ Allow students to report verbally to a scribe (teacher/ student) who can help in note taking.
- ☐ Permit students a range of options for reading and writing tasks.
- ☐ Where an activity requires reading, provide it in advance.
- ☐ Provide opportunities for enrichment.