

St. Clair Catholic District School Board

STUDENT INFORMATION SHEET / OUTLINE OF COURSE OF STUDY

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|--------------------------|---|
| School | St. Christopher Secondary School |
| Department | Mathematics |
| Course Title | Advanced Functions |
| Grade | 12 |
| Course Type | University |
| Teacher(s) | |
| Department Head | Mrs. Kirchmair |
| Credit | one full |
| Ministry Document | Mathematics Grades 11 and 12 (revised) |
| Prerequisite | Functions, Grade 11, or Mathematics for College Technology, Grade 12 |

Course Description

This course extends students' experience with functions. Students will investigate the properties of polynomial, rational, logarithmic, and trigonometric functions; develop techniques for combining functions; broaden their understanding of rates of change; and develop facility in applying these concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. This course is intended both for students taking the Calculus and Vectors course as a prerequisite for a university program and for those wishing to consolidate their understanding of mathematics before proceeding to any one of a variety of university programs.

How This Course Supports the Ontario Catholic Graduate Expectations:

Through the use of the Catholic course profile as well as additional resources (I.C.E. documents) the Ontario Catholic Graduate expectations will be addressed.

How This Course Supports the Competencies of Choices Into Action:

Career Exploration Activities through classroom experience (page 19, Choices into Action).

1. Overall Expectations for Student Learning

Through this course, the student will be expected to demonstrate knowledge, skills and values related to the following strands.

Strand 1: Exponential and Logarithmic Functions

- demonstrate an understanding of the relationship between exponential expressions and logarithmic expressions, evaluate logarithms, and apply the laws of logarithms to simplify numeric expressions;
- identify and describe some key features of the graphs of logarithmic functions, make connections among the numeric, graphical, and algebraic representations of logarithmic functions, and solve related problems graphically;
- solve exponential and simple logarithmic equations in one variable algebraically, including those in problems arising from real-world applications.

Strand 2: Trigonometric Functions

- demonstrate an understanding of the meaning and application of radian measure;
- make connections between trigonometric ratios and the graphical and algebraic representations of the corresponding trigonometric functions and between trigonometric functions and their reciprocals, and use these connections to solve problems;
- solve problems involving trigonometric equations and prove trigonometric identities.

Strand 3: Polynomial and Rational Functions

- identify and describe some key features of polynomial functions, and make connections between the numeric, graphical, and algebraic representations of polynomial functions;
- identify and describe some key features of the graphs of rational functions, and represent rational functions graphically;
- solve problems involving polynomial and simple rational equations graphically and algebraically;
- demonstrate an understanding of solving polynomial and simple rational inequalities.

Strand 4: Characteristics of Functions

- demonstrate an understanding of average and instantaneous rate of change, and determine, numerically and graphically, and interpret the average rate of change of a function over a given interval and the instantaneous rate of change of a function at a given point;
- determine functions that result from the addition, subtraction, multiplication, and division of two functions and from the composition of two functions, describe some properties of the resulting functions, and solve related problems;
- compare the characteristics of functions, and solve problems by modeling and reasoning with functions, including problems with solutions that are not accessible by standard algebraic techniques.

2. Expectations re: Learning Skills

It is expected that students will demonstrate the following learning skills (this is not intended to be an exhaustive list). Learning skills will be assessed according to criteria which have been clearly communicated to students and will be reported separately from student achievement of the curriculum expectations. The student's demonstrated learning skills in each course will be evaluated using the four-point scale

(E - Excellent, G - Good, S - Satisfactory, N - Needs Improvement)

- Strong work habits during class time
- Completed homework and assignments
- Organizational skills on a daily basis
- Initiative in all areas of the course
- Independent learning ability
- Team work ability
- Frequent review of concepts and skills

3. Supports For Higher Learning:

Whenever accommodations are made to address student learning needs, or alternative or modified expectations are identified for a student, these accommodations, modifications, or alternative expectations will be outlined in an IEP and will be communicated to parents.

4. Course Breakdown & Assessment and Evaluation Strategies:

| Unit | Unit Title / Description | Assessment & Evaluation Strategies | Unit Planning Notes |
|--------|---|------------------------------------|---------------------|
| Unit 1 | Polynomial Functions | checklists, tests, assignments | |
| Unit 2 | Polynomial Equations and Inequalities | checklists, tests, assignments | |
| Unit 3 | Rational Functions | checklists, tests, assignments | |
| Unit 4 | Trigonometry | checklists, tests, assignments | |
| Unit 5 | Trigonometric Functions | checklists, tests, assignments | |
| Unit 6 | Exponential and Logarithmic Functions | checklists, tests, assignments | |
| Unit 7 | Solving Exponential and Logarithmic Equations | checklists, tests, assignments | |
| Unit 8 | Combining Functions | Checklists, tests, assignments | |

5. Key Dates, Special Events, and Additional Considerations:

- to be announced by the teacher

6. Teaching / Learning Strategies:

Instruction in this course will include but not be limited to the following:

- use of technology tools: graphing calculators, computers
- presentation of homework solutions to class
- whole class activities
- pairs activities

7. Assessment and Evaluation:

Student achievement of the learning expectations will be evaluated according to the following breakdown.

| Categories of the Achievement Chart | Weighting (%) | |
|-------------------------------------|-----------------|----------------------------------|
| | Term Evaluation | Final Evaluation Activity / Exam |
| Knowledge / Understanding | 40% | 40% |
| Thinking | 15% | 15% |
| Application | 35% | 35% |
| Communication | 10% | 10% |
| Final Mark | 70% | 30% |

8. Learning Resources:

Textbook: Advanced Functions 12, McGraw-Hill Ryerson

9. School, Department and Classroom policies:

- use of student handbook: for reference and for time management

- be prepared for class: paper, pencil, graph paper, calculator
- keep work complete and up to date
- correct all tests and assignments