

**Course Syllabus (Section A)**  
**Department of Engineering Mathematics & Internetworking**  
MATH 1280 (online & in-person)  
Engineering Mathematics I  
Fall 2021

- Instructor:** Dr. Edward Yao, Edward.Yao@Dal.Ca  
Office: O'Brien Hall Room 210, Sexton Campus. Tel: 902-494-3921
- Lectures:** MWF 13:35 – 14:25  
Phase I (Sept 1 – 19): Asynchronous (recorded) – Brightspace (Panopto).  
Phase II (Sept 20 – Dec 7): In-Person – Studley MCCAIN ARTS&SS AUD-2 (Ondaatje Hall).
- Tutorials:** MWF 12:35 – 13:25  
Phase I (Sept 1 – 19): Synchronous (live) – Brightspace (Collaborate Ultra).  
Phase II (Sept 20 – Dec 7): In-Person – at various locations.
- Office Hours:** Post questions anonymously on the Discussions Board on Brightspace only.
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### **Course Description**

This forms an introduction to differential and integral calculus for Engineering students. All topics of MATH 1000.03 are covered, but in greater depth. In addition, this course covers functions, differentiation of polynomial, trigonometric, exponential, and logarithmic functions, product, quotient and chain rules, antiderivatives and definite integrals, Riemann sums, and polynomial approximations.

### **Course Prerequisites**

Nova Scotia Mathematics advanced 11 and 12 or pre-calculus. Pre-calculus is highly recommended.

### **Course Exclusion**

MATH 1000.03, MATH 1215.03

### **Learning Objectives**

- Develop students' conceptual understanding of single-variable functions in terms of the limit, continuity, derivative, and integration.
- Train students to efficiently perform fundamental calculations with these functions.
- Introduce engineering-related applications of this knowledge and skills.

### **Learning Outcomes**

1. Use principles of calculus involving limits and differentiation of rational, algebraic, and transcendental functions.
2. Use calculus to graph functions.
3. Use calculus to solve practical engineering problems involving related rates and optimization.
4. Use integration to compute areas and moments.

## Graduate Attributes

Performance Indicator (**01A**): Explain and apply mathematics for analysis and synthesis in engineering.

## Course Materials

### Textbook

Calculus - Early Transcendentals - third edition by Briggs and Cochran. This text covers single variable calculus topics where MATH 1280 covers Chapters 1- 5 and MATH 1290 covers Chapters 6 – 12, which is a must-have for taking both MATH 1280 and MATH 1290. The text can be purchased at Dal Bookstore: [https://bookstore.dal.ca/CourseSearch/?course\[\]=SUB,FALL21,MATH,MATH1280,&](https://bookstore.dal.ca/CourseSearch/?course[]=SUB,FALL21,MATH,MATH1280,&). Please note: MyLab Math is not required for both MATH 1280 and MATH 1290.

### Web Resources

See Brightspace for the course syllabus, announcements, assignment solutions, quiz answers, watching video-recorded lectures and attending live tutorial sessions (Phase I only), and asking course/math questions on the Discussions Board, etc. Log in using your NetID. You should see a link to the course MATH 1280.

## Course Assessment

Component	Weight (% of final grade)	Date
<i>Assignments</i>		
Assignment 1 (Part A)	0.5%	September 13
Assignment 2 (Parts A-C)	0.5%	September 20
Assignment 3 (Parts A-C)	1%	September 27
Assignment 4 (Parts A-C)	1%	October 4
Assignment 5 (Parts A-C)	1%	October 13
Assignment 6 (Parts A-E)	1%	October 25
Assignment 7 (Parts A-C)	1%	November 1
Assignment 8 (Parts A-C)	1%	November 15
Assignment 9 (Parts A-C)	1%	November 22
Assignment 10 (Parts A-B)	1%	November 29
Assignment 11 (Parts A-C)	1%	December 7
<i>Quizzes</i>		
Quiz 1 (covers Assignments 1 – 2)	13%	September 29
Quiz 2 (covers Assignments 3 – 4)	18%	October 15
Quiz 3 (covers Assignments 5 – 6)	18%	November 3
Quiz 4 (covers Assignments 7 – 8)	18%	November 26
Quiz 5 (covers Assignments 9 – 11)	23%	In exam period (TBA)

(*Final exam*) Quiz 5 is treated as the final exam for the course.

**Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale**

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

**Course Policies****Assignments**

All eleven Assignments count. All ten Assignments are to be submitted in PDF on Brightspace only. No late assignments will be accepted. Assignments without a required cover sheet will not be marked. A **subset marking** policy is adopted for all Assignments. Please follow the **Student Absence Reporting** stated in Section B of the syllabus for any *legitimately* late or missed assignments up to a maximum of two times. Upon approval by the Associate Dean's Office, the missed work will be granted a waiver.

**Quizzes**

All five Quizzes count. Quizzes are to be done in classrooms with invigilators present and submitted in PDF on Brightspace only. Quiz dates are given above. No calculators of any kind are allowed. Turn off all electronic devices that make noise. In case, a Quiz cannot be completed due to an illness diagnosed by a physician, not a nurse, please follow the **Student Absence Reporting** stated in Section B of the syllabus to fill in a form and submit it together with a doctor's note to the Associate Dean's Office for approval. If missing one quiz and upon approval by the Associate Dean's Office, the missed quiz will be replaced by a comprehensive test to be held on Friday, December 3 only. If missing multiple quizzes during the term, the student will be reported to the Associate Dean's Office for its final academic decision.

**Course Content****Course Outline**

1. Review of polynomial, exponential, logarithmic trigonometric, and inverse functions (Chapter 1).
2. Limits: techniques for computing limits, horizontal and vertical asymptotes, continuity (Chapter 2).
3. Derivatives: first principles, rules of differentiation, product, quotient and chain rules, related rate problems (Chapter 3).
4. Applications of the derivative: optimization problems, curve sketching, linear approximations, L'Hospital's rule, Newton's Method, antiderivatives (Chapter 4).
5. Integration: area under a curve, definite integrals, the Fundamental Theorem of Calculus, the substitution rule (Chapter 5).

**Schedule**

Instruction:

1. The Schedule contains two phases: Phase I (online) and Phase II (in-person).
2. Each Assignment may contain several parts related to Lectures. Assignments must be completed & converted to a PDF file and submitted on Brightspace by 13:25 on the due dates. Each Assignment must include a filled-in assignment cover sheet which can be downloaded from Brightspace. Assignments must be completed independently. A copy of others' assignment work is strictly forbidden.

## Phase I (Sept 7 – 19) – Online

Tutorials: MWF 12:35 – 13:25, Synchronous (**live**), Brightspace.

Lectures: MWF 13:35 – 14:25, Asynchronous (**video-recorded**), Brightspace.

Week	Date	Material for Lecture, Tutorial, and Assignment
1	Sept 7	No class. A video-recorded course introduction released.
	Sept 8	<b>LEC-01:</b> Sec 1.1 Review of Functions (pages 1 – 9) Sec 1.2 Representing Functions (pages 13 – 22)  Assignment 1 (Part A): Sec 1.1: 40, 58, 74, 76, and Sec 1.2: 42, 62, 78.
	Sept 10	<b>TUT-01:</b> Sec 1.1: 39, 57, 73, 75, and Sec 1.2: 41, 61, 79.  <b>LEC-02:</b> Sec 1.3 Inverse, Exponential, and Logarithmic Functions (pages 27 – 35) Sec 1.4 Trigonometric Functions and Their Inverses (pages 39 – 48)  Assignment 2 (Part A): Sec 1.3: 26, 44, 90, and Sec 1.4: 38, 60, 62, 114.
	Sept 13	<b>Assignment 1 (including only Part A) due by 13:25</b>  <b>LEC-03:</b> Sec 2.1 The Idea of Limits (pages 56 - 60) Sec 2.2 Definition of Limits (pages 63 - 67)  Assignment 2 (Part B): Sec 2.1: 33, and Sec 2.2: 18, 34, 48.
2	Sept 15	<b>TUT-02:</b> Sec 1.3: 22, 43, 89, Sec 1.4: 37, 59, 63, 113, and Sec 2.1: 31.  <b>LEC-04:</b> Sec 2.3 Techniques for Computing Limits (pages 71 - 79)  Assignment 2 (Part C): Sec 2.3: 34, 42, 56, 62, 64, 74, 80, 82(b), 88, 92.
	Sept 17	<b>TUT-03:</b> Sec 2.2: 17, 35, 47, and Sec 2.3: 33, 43, 57, 61, 65, 73, 79, 81(a)(c), 87, 91.  <b>LEC-05:</b> Sec 2.4 Infinite Limits (pages 83 - 88)  Assignment 3 (Part A): Sec 2.4: 18, 26, 30, 32, 40, 44, 50.  <b>Sept 17: Last day to drop fall term courses</b>

## Phase II (Sept 20 – Dec 7) – In-Person

Tutorials: MWF 12:35 – 13:25, at various locations.

Lectures: MWF 13:35 – 14:25, Ondaatje Hall.

Week	Date	Material for Lecture, Tutorial, and Assignment
3	Sept 20	<p><b>Assignment 1</b> returning, <b>Assignment 2 (including Parts A - C)</b> due by 13:25</p> <p><b>LEC-06:</b> Sec 2.5 Limits at Infinity (pages 91 - 100)</p> <p>Assignment 3 (Part B): Sec 2.5: 26, 30, 34, 44, 54(a)(b), 58, 64, 78, 86.</p>
	Sept 22	<p><b>TUT-04:</b> Sec 2.4: 17, 25, 29, 31, 39, 43, 49, *67, and Sec 2.5: 25, 29, 33, 45.</p> <p><b>LEC-07:</b> Sec 2.6 Continuity (pages 103 - 112)</p> <p>Assignment 3 (Part C): Sec 2.6: 28, 32, 40, 44, 56, 60, 64, 70(a), 76(a).</p>
	Sept 24	<p><b>TUT-05:</b> Sec 2.5: 53(a)(b), 57, 65, 73, 87, and Sec 2.6: 27, 33, 39, 43, 55, 59, 63, 69(a), 75(a).</p> <p><b>LEC-08:</b> Sec3.1 Introducing the Derivatives (pages 131 - 137)</p> <p>Assignment 4 (Part A): Sec 3.1: 38, 46, 48, 54.</p>
4	Sept 27	<p><b>Assignment 2</b> returning, <b>Assignment 3 (including Parts A - C)</b> due by 13:25</p> <p><b>TUT-06:</b> Sec 3.1: 37, 45, 49, 53.</p> <p><b>LEC-09:</b> Sec 3.2 The Derivatives as a Function (pages 140 - 148)</p> <p>Assignment 4 (Part B): Sec 3.2: 20, 26, 46, 48, 56, 72.</p>
	<b>Sept 29</b>	<p><b>Quiz 1 held during the tutorial time</b></p> <p><b>LEC-10:</b> Sec3.3 Rules of Differentiation (pages 152 - 159)</p> <p>Assignment 4 (Part C): Sec 3.3: 40, 44, 46, 54, 64, 70, 82.</p>

	Oct 1	<p><b>TUT-07:</b> Sec 3.2: 19, 25, 45, 49, 55, 71, *47, and Sec 3.3: 39, 43, 47, 53, 63, 71, 83.</p> <p><b>LEC-11:</b> Sec 3.4 The Product and Quotient Rules (pages 163 - 167)</p> <p>Assignment 5 (Part A): Sec 3.4: 32, 46, 62, 66, 70.</p> <p>Oct 1: Last day to drop fall term courses without a "W"</p>
5	Oct 4	<p>Assignment 3 returning, Assignment 4 (including Parts A - C) due by 13:25</p> <p><b>LEC-12:</b> Sec 3.5 Derivatives of Trigonometric Functions (pages 171 - 175)</p> <p>Assignment 5 (Part B): Sec 3.5: 16, 48, 56(b)(c), 66, 84.</p>
	Oct 6	<p><b>TUT-08:</b> Sec 3.4: 31, 45, 61, 65, 71, and Sec 3.5: 15, 47.</p> <p><b>LEC-13:</b> Sec 3.6 Derivatives as Rates of Change (pages 178 - 186)</p> <p>Assignment 5 (Part C): Sec 3.6: 12, 24, 32, 34, 40.</p>
	Oct 8	<p><b>TUT-09:</b> Sec 3.5: 55(b)(d)(f), 67, 85, and Sec 3.6: 11, 23, 31, 33, 41.</p> <p><b>LEC-14:</b> Sec 3.7 The Chain Rule (pages 191 - 196)</p> <p>Assignment 6 (Part A): Sec 3.7: 30, 54, 60, 62, 78.</p>
6	Oct 11	Thanksgiving Day, University closed
	Oct 13	<p>Assignment 4 returning, Assignment 5 (including Parts A - C) due by 13:25</p> <p><b>TUT-10:</b> Sec 3.7: 29, 53, 59, 61, 83.</p> <p><b>LEC-15:</b> Sec 3.8 Implicit Differentiation (pages 201 - 204)</p> <p>Assignment 6 (Part B): Sec 3.8: 24, 40, 44, 52, 63.</p>
	<b>Oct 15</b>	<p><b>Quiz 2 held during the tutorial time</b></p> <p><b>LEC-16:</b> Sec 3.9 Derivatives of logarithmic and Exponential Functions (pages 208 - 215)</p> <p>Assignment 6 (Part C): Sec 3.9: 26, 56, 62, 74, 84.</p>

7	<p>Oct 18</p> <p>Oct 20</p> <p>Oct 22</p>	<p><b>TUT-11:</b> Sec 3.8: 23, 33, 43, 51, 60, and Sec 3.9: 19, 58.</p> <p><b>LEC-17:</b> Sec 3.10 Derivatives of Inverse Trigonometric Functions (pages 218 - 224)</p> <p>Assignment 6 (Part D): Sec 3.10: 18, 22, 34, 46, 56, 82.</p> <p><b>TUT-12:</b> Sec 3.9: 61, 73, 83, and Sec 3.10: 17, 27, 35, 45, 51, 81.</p> <p><b>LEC-18:</b> Sec 3.11 Related Rates (pages 227 - 230)</p> <p>Assignment 6 (Part E): Sec 3.11: 26, 29, 36, 60.</p> <p><b>TUT-13:</b> Sec 3.11: 25, 30, 37, 59.</p> <p><b>LEC-19:</b> Sec 4.1 Maxima and Minima (pages 241 - 247)</p> <p>Assignment 7 (Part A): Sec 4.1: 20, 28, 44, 46, 74,</p>
8	<p>Oct 25</p> <p>Oct 27</p> <p>Oct 29</p>	<p><b>Assignment 5 returning, Assignment 6 (including Parts A - E) due by 13:25</b></p> <p><b>LEC-20:</b> Sec 4.2 Mean Value Theorem (pages 250 - 254)</p> <p>Assignment 7 (Part B): Sec 4.2: 6, 18, 22, 36, 40, 44.</p> <p><b>TUT-14:</b> Sec 4.1: 19, 23, 43, 47, 73, and Sec 4.2: 7, 17, 21, 37.</p> <p><b>LEC-21:</b> Sec 4.3 What Derivatives Tell Us (pages 257 - 266)</p> <p>Assignment 7 (Part C): Sec 4.3: 24, 46, 56, 62, 64, 80, 96, 102.</p> <p><b>TUT-15:</b> Sec 4.2: 41, 43, and Sec 4.3: 23, 45, 55, 61, 63, 77, 97, 105.</p> <p><b>LEC-22:</b> Sec 4.4 Graphing Functions (pages 271 - 277)</p> <p>Assignment 8 (Part A): Sec 4.4: 32, 48.</p>



9	<p>Nov 1</p> <p><b>Nov 3</b></p> <p>Nov 5</p>	<p>Assignment 6 returning, Assignment 7 (including Parts A - C) due by 13:25</p> <p><b>TUT-16:</b> Sec 4.4: 29, 47.</p> <p><b>LEC-23:</b> Sec 4.5 Optimization Problems (pages 280 - 284)</p> <p>Assignment 8 (Part B): Sec 4.5: 18, 26, 30, 37, 42, 51.</p> <p><b>Quiz 3 held during the tutorial time</b></p> <p><b>LEC-24:</b> Sec 4.6 Linear Approximation and Differentials (pages 292 - 298)</p> <p>Assignment 8 (Part C): Sec 4.6: 20, 28, 42, 48, 58, 66.</p> <p><b>TUT-17:</b> Sec 4.5: 17, 27, 31, 36, 41, 50, and Sec 4.6: 19, 33, 39, 47, 55, 63.</p> <p><b>LEC-25:</b> Sec 4.7: L'Hospital's Rule (pages 301 - 310)</p> <p>Assignment 9 (Part A): Sec 4.7: 22, 24, 28, 34, 60, 64, 76, 78, 86, 96.</p> <p>Nov 1: Last day to drop fall term classes with a "W"</p>
<p>Fall Study Break: Nov 8 – 12, no classes (university open)</p>		
10	<p>Nov 15</p> <p>Nov 17</p> <p>Nov 19</p>	<p>Assignment 7 returning, Assignment 8 (including Parts A - C) due by 13:25</p> <p><b>TUT-18:</b> Sec 4.7: 21, 23, 27, 33, 59, 63, 75, 77, 87, 95.</p> <p><b>LEC-26:</b> Sec 4.8 Newton's Method (pages 312 - 318)</p> <p>Assignment 9 (Part B): Sec 4.8: 12, 14, 36.</p> <p><b>TUT-19:</b> Sec 4.8: 11, 13, 35.</p> <p><b>LEC-27:</b> Sec 4.9 Antiderivatives (pages 321 - 331)</p> <p>Assignment 9 (Part C): Sec 4.9: 24, 28, 36, 40, 58, 70, 78, 98.</p> <p><b>TUT-20:</b> Sec 4.9: 23, 27, 35, 39, 53, 69, 77, 97.</p> <p><b>LEC-28:</b> Sec 5.1 Approximating Areas under Curves (pages 338 - 346)</p> <p>Assignment 10 (Part A): Sec 5.1: 10, 15(b), 24, 40, 48, 49(g), 70.</p>



11	<p>Nov 22</p>       <p>Nov 24</p>    <p><b>Nov 26</b></p>	<p>Assignment 8 returning, Assignment 9 (including Parts A - C) due by 13:25</p> <p><b>TUT-21:</b> Sec 5.1: 9, 15(a), 23, 37, 47, 49(a), 71.</p> <p><b>LEC-29:</b> Sec 5.2 Definite Integrals (pages 353 - 363)</p> <p>Assignment 10 (Part B): Sec 5.2: 22, 36, 42, 50, 54, 64, 80.</p> <p><b>TUT-22:</b> Sec 5.2: 21, 35, 41, 49, 55, 63, 79.</p> <p><b>LEC-30:</b> Sec 5.3 Fundamental Theorem of Calculus (pages 367 - 377)</p> <p>Assignment 11 (Part A): Sec 5.3: 14, 24, 46, 62, 68, 74, 88.</p> <p><b>Quiz 4 held during the tutorial time</b></p> <p><b>LEC-31:</b> Sec 5.4 Working with Integrals (pages 381 - 385)</p> <p>Assignment 11 (Part B): Sec 5.4: 12, 20, 38, 40, 47.</p>
12	<p>Nov 29</p>       <p>Dec 1</p> <p>Dec 3</p>	<p>Assignment 9 returning, Assignment 10 (including Parts A - B) due by 13:25</p> <p><b>TUT-23:</b> Sec 5.3: 13, 23, 45, 61, 67, 73, 89.</p> <p><b>LEC-32:</b> Sec 5.5 Substitution Rule (pages 388 - 395)</p> <p>Assignment 11 (Part C): Sec 5.5: 20, 26, 36, 44, 48, 52, 62, 84, 104.</p> <p><b>TUT-24:</b> Sec 5.4: 11, 21, 37, 39, 46, and Sec 5.5: 17, 25, 35, 39, 49, 57, 65, 83, 105.</p> <p>No class. Notes for Sec 2.7 posted, which is excluding from Quiz 5.</p> <p>No class</p>
13	<p>Dec 6</p> <p>Dec 7</p>	<p>No class</p> <p>Assignment 10 returning, Assignment 11 (including Parts A - C) due by 13:25</p> <p><b>Quiz 5 held in exam period (TBA)</b></p>