

MATH 110 Differential Calculus

September 2018 – April 2019

Course Information: MATH 110 covers the same topics as MATH 100 (Derivatives of elementary functions; Applications and modeling: graphing, optimization), but including relevant topics from algebra, geometry, functions, trigonometry, logarithms, and exponentials.

Prerequisite: BC Principles of Mathematics 12 or Pre-calculus 12 (or equivalent), plus permission of the Mathematics Department; permission will normally be based on a low grade in BC Principles of Mathematics 12 or Pre-calculus 12 (or equivalent) and a low score in the optional UBC Mathematics Basic Skills Test if taken.

MATH 110 is a year-long course, with three hours of lecture and a 1.5-hour workshop every week. There are weekly online assignments (common to all sections), and biweekly written assignments and quizzes (section specific).

There are two midterm exams (in October and February) and two end-of-term examinations (in December and April). Both end-of-term examinations follow UBC final exam guidelines and policies. All exams are common to all sections of the course. The dates of the midterm exams are

- October midterm: October 23rd, 6pm (to be confirmed)
- February midterm: February 26th, 6pm (to be confirmed)

Course website: General information about the course relevant to all sections is available on Canvas under the course MATH 110 ALL. Links to website for individual sections are available on the Canvas course.

Textbook: The required textbook is *Contemporary Calculus* by Dale Hoffman. This is an online textbook available for free under the Creative Commons license. The pdf is available on Canvas. Extra notes will be posted as the year progresses.

Workshops: MATH 110 includes weekly problem-solving workshops, where students have the opportunity to work in groups on challenging math problems. Each workshop focuses on calculus concepts and techniques discussed in lectures the previous week. Attendance to workshops is *mandatory*. More details are provided in the Workshop page on Canvas.

Weekly schedule: This is an approximate weekly schedule of each term (subject to changes). The section numbers refer to the course textbook; extra notes will be posted during the course.

Week	Topics	Sections	Notes
	TERM 1		
1.1	Introduction, Lines on plane	0.2	No workshops
1.2	Functions	0.2-0.4	No written homework
1.3	Tangent lines and velocity	1.0	Quiz
1.4	Evaluating limits	1.1,1.2	Written Homework
1.5	Continuity	1.3	Quiz

1.6	The definition of derivative, derivative as slope and rate of change	2.0, 2.1	Written Homework
1.7	Differentiation rules – part I,	2.2	Quiz
1.8	Exponentials – Review and derivatives	Extra notes	Midterm exam, no workshops, no written homework
1.9	Trigonometry – Review and derivatives	Extra notes	Quiz
1.10	Differentiation rules – Part II: The chain rule	2.4	Written Homework
1.11	Logarithms – Review and derivatives	2.0	Quiz
1.12	Application: Exponential Growth/Decay models	Extra notes	Written Homework
1.13	The second derivative and Acceleration	2.3	Quiz
	TERM 2		
2.1	Implicit differentiation	2.9	No workshops
2.2	Related rates problems	2.6	Written Homework
2.3	More examples of related rates	2.6	Quiz
2.4	Extrema and the Mean Value Theorem	3.1, 3.2	Written Homework
2.5	The first derivative test	3.3	Quiz
2.6	Concavity and Inflection Points	3.3	Homework
2.7	Asymptotic behaviour	3.3, 3.4	Quiz
2.8	Curve sketching	3.6, 3.7	Midterm exam, no workshops, no written homework
2.9	Applied Optimization	3.5	Quiz
2.10	More examples of Optimization	3.5	Written homework
2.11	Approximations	2.8	Quiz
2.12	More examples on Approximations	Extra notes	Written homework
2.13	Antiderivatives	Extra notes	Quiz

Evaluation and Grading scheme

Course component	% of final grade
Section specific	
Quizzes	4%
Written homework	4%
WeBWorK (online homework)	9%
Workshops	13%
October midterm	10%
February midterm	10%
December Exam	20%
April Exam	30%

Course Policies

1. **Final exams:** Both the December and the April exams are considered “final exams” and follow UBC exam guidelines. Exemptions for missed exams are granted only for special cases (exam hardships, health issues, extenuating circumstances, etc.) as per UBC exam policies; note that travelling is not considered a valuable reason for requesting a deferred exam.
2. **Requirements for passing the course:** In order to pass the course, a student must write both the December and the April exam and achieve a score of 30% or higher on the April exam and an overall score of 50% or higher in the course.
3. **No unauthorized electronic devices** will be allowed at the midterms or the final exams. This includes cell phones, smart phones, etc.
4. **No calculators** will be allowed during exams and quizzes.
5. **No notes, textbooks, formula sheets**, or other written material other than the one handed out by invigilators will be allowed during exams and quizzes.
6. **Missed quizzes:** If a quiz is missed for a documented reason, it will be ignored. There are no make-up quizzes in this course. Documented reasons for missing a quiz are: (a) prior notice of a valid, documented absence (e.g. out-of-town varsity athletic commitment accompanied by a letter from a coach) on the scheduled date; or (b) notification to the instructor within 48 hours of absence due to medical condition or other extenuating circumstances. Original written documentation, for example a doctor's note, is required. If no documentation is provided, a score of 0 will be given for the missed quiz.
7. **Missed midterms:** Permission to write a make-up midterm exam is granted only to students who cannot write the evening test due to scheduling conflicts (e.g. scheduled lab or class in another course) or important out-of-school commitments (e.g. work). In this case, a make-up exam is scheduled in consultation with the instructor. If a midterm exam is missed for other reasons, the same policies for missed quizzes apply and appropriate documentation must be provided (see above). In this case, the missed midterm exam is ignored and its weight is moved to the end-of-term exam.
8. **Scaling:** The final mark distribution of the quizzes and written homework of each section may be scaled based on the April exam mark distribution of that section. This is to ensure fairness in assessment across sections.