MATH1M03 Information Sheet (Winter 2018)

The course web page can be found on AVenue to Learn

Sections:

C01	TuWeFr 12:30	TSH/120	with D. Lozinski
C02	MoTh 12:30 Tu 1:30	TSH/120	with R. Monter
C03	TuThFr 2:30	LRW/B1007	with T. Hurd

Instructors:

Dr. David Lozinski (co-ordinator)	HH/315	x23409	lozinski@math.mcmaster.ca
Dr. Rosario Monter	HH/204	x23423	monter1@mcmaster.ca
Dr. Tom Hurd	HH/416	x27304	hurdt@mcmaster.ca

Office hours can be found on the department web site or on AVenue to Learn.

Textbook:

Applied Calculus for Business, Economics, and the Social and Life Sciences, 11th edition, by Laurence Hoffmann & Gerald Bradley, published by McGraw-Hill, in either bound, unbound or electronic version. The hardcover edition and unbound edition are the same.

Calculator: Only the standard Casio fx 991 MS or MS Plus calculator is permitted.

Topics:

Integral calculus of polynomial, rational, exponential and logarithmic functions. Optimization problems. Applications in the Social Sciences and Business.

Lectures and Tutorials:

The course will cover material from portions of chapters 4, 5, 6, 7, 9, and 11 of the text. Students are assumed to know, and are responsible for, all materials in chapters 1, 2, and 3, as well as the first few sections of chapter 4.

There are three large tutorial sections. The tutorials are intended to provide additional material to help students learn the course material, and provide opportunities to ask additional questions and seek help. People ask if the tutorials are mandatory; they are not mandatory, but passing the course is not mandatory either. Please make good use of them.

More personalized assistance can be obtained by coming to the Math Drop-In Centre on the first floor of Hamilton Hall. Tutors are freely available to assist with Calculus questions generally:
Monday-Thursday: 2:30 pm - 8:30 pm, Friday: 2:30 pm - 6:30 pm
More detailed times and information is available on their web site:
http://ms.mcmaster.ca/∼mcleac3/Site/HelpCentreSite.html

Mid-Term Tests: There are 3 midterm tests tentatively set for the evenings of
Tuesday, February 6
Monday, March 5
Monday, March 26
The topics covered will be announced in class.
You MUST bring your student ID to all tests, or your mark will be zero.

Assignments:
There will be weekly on-line assignments that close each Friday at midnight. The first assignment (as well as an "Assignment 0" to introduce you to the assignment system, and which does not count towards your grade) will close at midnight on Friday, January 19. The assignment system can first be accessed through the course web site on Avenue.

Final Exam: A 2.5 hour final exam administered by the registrar will cover all course material.

Marking Scheme:

Three midterm tests	42%
Nine On-line assignments at 2% each	18%
Final Examination	40%

Official Policies:
Exemptions from course work - Master Student Absence Form (MSAF): This is an on-line, self-reporting tool for students to report absences that last up to 3 days and to request accommodation for any missed academic work that is worth less than 25% of the final grade. Please note that this tool cannot be used during any final examination period. It is the prerogative of the instructor to determine the appropriate relief for missed termwork. You may submit a maximum of one request per term. The form should be filled out within 3 days of the due date. It is your responsibility to follow up with thecourse co-ordinator, D. Lozinski at lozinski@math.mcmaster.ca, immediately (within two working days) about the absence. Where approved, the missing grade will be replaced with the grade on the final exam

Academic ethics Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of a academic dishonesty please refer to the Academic Integrity Policy (http://www.mcmaster.ca/senate/academic/ac_integrity.htm) specifically Appendix 3. The following illustrates only three forms of academic dishonesty:
1. Plagiarism, e.g., the submission of work that is not one's own or which has been used for other credit.
2. Improper collaboration in group work. 3. Copying or using unauthorized aids in tests and exams.

Course Modifications The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

MATH 1M03 - Rough summary of topics covered

Chapter 4: Exponential and Logarithmic Functions

- 4.1 Exponential Functions
  - $f(x) = b^x$ and its graph for positive/negative x
  - $b^x b^y = b^{x+y}$, $b^x/b^y = b^{x-y}$, $(b^x)^y = b^{xy}$, $(ab)^x = a^x b^x$
  - continuously compounding interest
  - exponential growth and decay, doubling time, half life
- 4.2 Logarithmic Functions
  - $y = \log_b x \iff b^y = x$, $x > 0$
  - $\log_b(uv) = \log_b u + \log_b v$, $\log_b(u/v) = \log_b u - \log_b v$, $\log_b u^r = r \log_b u$
  - $\log_b a = (\log_c a)/(\log_c b)$
  - natural log and its graphs
- 4.3 Differentiation of Log and Exp Functions
  - $\frac{d}{dx} \ln u(x)$, $\frac{d}{dx} e^{u(x)}$
- 4.4 Additional Exponential Models
  - working with functions like learning curves and logistic growth (do not memorize those functions. If needed, they will be given to you)
  - calibrating and interpretting curves from word problems

Chapter 5: Integration

- 5.1 Antidifferentiation and the Indefinite Integral
  - antiderivative ($\int f(x)dx$) for simple functions
  - inclusion of arbitrary constant, determination of constant from intial values
- 5.2 Integration by Substitution
  - recognition of integrands coming from a chain rule
  - choosing $u(x)$ so that du is readily obtained, and a simpler integral in u is obtained
- 5.3 Definite Integral and Fundamental Theorem of Calculus
  - definite integral as a continuous limit of a sum
  - Fundamental Theorem of Calculus
  - substitution in the case of a definite intgeral (changing the limits of integration)
  - area under a curve
- 5.4 Applications: Area Between Curves and Average Value
  - average value of a function only
- 5.5 Applications to Business and Economics IS OMITTED
  - future value and present value of a continuous income stream NOT on the exam

Chapter 6: More Integration

- 6.1 Integration by Parts
  - integration by parts, $\int udv = uv - \int vdu$ to produce an easier-to-do integral
  - integration by parts for definite integrals
  - integral tables omitted
- 6.3 Improper Integrals
  - Integrals to infinity as a limit of an integral to a large finite number N
  - Convergence and divergence
  - In infinite limits, exponential functions will dominate polynomial functions

Chapter 7: Calculus of Several Variables

- 7.1 Functions of Several Variables
  - working with functions of more than one variable, particularly in applications
  - domain of a function
  - level curves
  - know basic curves: circle, ellipse, parabola, hyperbola (two common ways)
- 7.2 Partial Derivatives
  - partial derivatives as a limit
  - partial derivatives as a rate of change with respect to one variable keeping others fixed
  - partial derivatives as a slope along a cross-section
  - practice at taking first and second order partials
  - chain rule for $f(x, y)$ where $x(t)$ and $y(t)$ are functions of t
  - substitute and complementary commodities omitted
- 7.3 Optimizing Functions
  - concept of a relative extrema, applications involving optimization
  - critical points
  - second partials test to determine if a critical point is a saddle, or relative max or min
- 7.5 Constrained Optimization: Lagrange Multipliers
  - concept of optimizing subject to a constraint, applications
  - use of Lagrange multipliers to identify possible constrained optima
  - set and solve appropriate systems of equations, test resulting points

Chapter 9: Differential Equations

- 9.1 Introduction to Differential Equations
  - differential equations, general solution, initial value problem, particular solution
  - simple differential equations (only the derivative appears)
  - separable 1st order differential equations
- 9.2 First Order Linear Differential Equations
  - identifying 1st order linear, and arranging the equation in the form $y' + p(x)y = q(x)$
  - use of an integrating factor to make a perfect derivative
  - integrating and isolating for the general solution

Chapter 11: Probability and Calculus

- 11.2 Continuous Random Variables
  - continuous random variables
  - probability density functions, concept, properties, construction
  - uniform distributions
  - exponential density functions
  - joint probability density functions omitted
- 10.3 Expected Value and Variance
  - expectation $E(X) = \int_{-\infty}^{+\infty} xf(x)dx = \mu$
  - variance $\text{Var}(X) = \int_{-\infty}^{+\infty}(x-\mu)^2 f(x)dx = \int_{-\infty}^{+\infty} x^2 f(x)dx - \mu^2$
  - standard deviation $= \sqrt{\text{variance}}$
- 10.4 Normal and Poisson Probability Distribution
  - normal density function for mean μ and standard deviation σ
  - standard normal distribution, and the use of the table from the text (it will be provided on exam)
  - determining values for other normally distributed variables as $Z = (X - \mu)/\sigma$
  - computing probabilities for outcome ranges, determining outcome ranges for probabilities
  - applications
  - Poisson probability distribution