

MATH 108-002: Introductory Calculus with Business Applications
Syllabus, Fall 2019

Course objectives. To provide a basic firm understanding of elementary calculus, with a view towards applications to business and other disciplines. This course satisfies GMU's Quantitative Reasoning Foundation Requirement (see <https://chss.gmu.edu/general-education/all-requirements>). The learning outcomes that we will achieve to meet that requirement are:

1. Students are able to interpret quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw inferences from them.
2. Given a quantitative problem, students are able to formulate the problem quantitatively and use appropriate arithmetic, algebraic, and/or statistical methods to solve the problem.
3. Students are able to evaluate logical arguments using quantitative reasoning.
4. Students are able to communicate and present quantitative results effectively.

The course itself seeks to satisfy the following goals:

1. Students improve and solidify their algebraic skills.
2. Students understand and apply derivatives as a tool to analyze change in quantified models.
3. Students analyze and interpret results in the context of Business and IT applications.
4. Students understand and compute integrals and their relationship to derivatives.

Prerequisite. Minimum score of 13 in "Math Placement Algebra I."

Required materials (choose between options 1 and 2 below).

1. Access Code only for the ebook of Branett, Ziegler, Byleen, Stocker, Applied calculus for business, economics, life sciences, and social sciences, 14th edition, 2019.
2. The paper book of Branett, Ziegler, Byleen, Stocker, Applied calculus for business, economics, life sciences, and social sciences, 14th edition, 2019, plus NEW online app MyMathLab (google for "CALCULUS F/BUS.,ECON... (LOOSE) - W/ACCESS").
3. Simple scientific calculator (like TI 30X IIS). No advanced or graphic calculator is allowed.

Recommended software. Free online app WolframAlpha (<http://www.wolframalpha.com>).

Material to be covered. Chapters 1-5 (with some sections omitted).

Lectures. TR, 9:00 am–10:15 am, East Building, Room 201.

Instructor. Dr. Valeriu Soltan. Office: Exploratory Hall, Room 4202. Email: vsoltan@gmu.edu

Office hours. TR, 12:00 pm-1:00 pm, or by appointment.

Homework. Problems for the homework are given in the course outline (see next page). Although these will not be collected, success in tests and final exam strongly depends on their completing and understanding.

Tests and exam. There will be twelve end-of-class quizzes, two midterms, and final exam. All tests are closed-book and closed-notes. Simple calculators are allowed.

Important days. Tests (tentatively, September 26 and November 5), Fall break (October 15), Thanksgiving recess (November 28), last day of classes (December 5), final exam (December 12, 7:30 am–10:15 am).

Attendance and make-ups. Each student is expected to come to class regularly. No make-ups for quizzes and tests are allowed unless you provide a serious written excuse. Excused quizzes and tests should be taken within a timely fashion before the next quiz or test.

Grading. Quizzes are 40% in total, midterms are 16% each, and final exam is 28% of the total score. Your grade for the course is the sum of scores for quizzes, midterms, and final exam. Two worst results

for quizzes will be dropped. There is no curving, extra crediting, etc. Equivalence between scores and letters, recommended by GMU, is given in the table below.

A+	A	A-	B+	B	B-	C+	C	C-	D	F
100-97+	97-93+	93-90+	90-87+	87-83+	83-80+	80-77+	77-76+	73-70+	70-60+	60-0

GMU policies on final exams. The final exam may not be given during the last week of classes. If you need to change the date of your final exam for unusual circumstances or because you have more than two final exams scheduled in one day, you have to obtain professor's approval at least a week prior to the last day of classes. Retaking quizzes, midterms, and final exam is not permitted.

Absence from the final exam will not be excused except for sickness on the day of the exam confirmed by physician's note or for other causes approved by the student's academic dean or director. If a student missed the final exam due to illness or a family emergency, an incomplete grade (IN) may be assigned provided the student took all three tests with a total score 36 or higher. If absence from the final exam is unexcused, the grade for the course is F.

Academic integrity and university policies. Mason is an Honor Code university. See for other policies at <http://universitypolicy.gmu.edu/>. Students are responsible for knowing and following established policies.

ODS. If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services. All academic accommodations must be arranged through this office.

Religious holydays. If you observe upcoming religious holidays (see <https://ulife.gmu.edu/religious-holiday-calendar/>), please inform me one week in advance about a possible overlap with a day of quiz, midterm, or final exam.

WolframAlpha Notation and Commands	
$f(x) = x^2 - 7x + 3$, $y = 1/x^3$, $ x $, $\text{sqrt}(x)$,	$x^{(1/3)}$, $\text{exp}(x)$, e^x , $\ln(x)$, $\log(x)$, $\log_2(x)$
if $f(x) = x^2 - 7x + 3$, find $f(3)$	graph $(x-2)/(x+3)$ from $x=0$ to 15
find the domain for $(x-2)/(x+3)$	intercepts $3x - 4y = 12$
line through (1,2) and (2,1)	solve $3x - 4y = 12$ for y
intersect $1 + x$ and $3 - x$	
solve $x^3 - 8 = 0$, solve $x^3 - 8 > 0$	if $f(x) = x^3 - 8$, solve $f(x) = 0$
limit $((x+2)/x)^2$ as $x \rightarrow 1$	if $f(x) = ((x+2)/x)^2$, find limit $f(x)$ as $x \rightarrow 1$
limit $((x+2)/x)^2$ as $x \rightarrow \text{infinity}$	if $f(x) = ((x+2)/x)^2$, find limit $f(x)$ as $x \rightarrow \text{infinity}$
asymptotes $x^2/(2x-4)$	asymptotes $f(x) = x^2/(2x-4)$
discontinuity $(x-1)/(x+2)$	discontinuity $f(x) = (x-1)/(x+2)$
differentiate $90x^2 - x^3$	differentiate $f(x) = 90x^2 - x^3$
differentiate $90x^2 - x^3$ at $x=15$	differentiate $f(x) = 90x^2 - x^3$ where $x=15$
d/dx for $(x^2+3x)/(x^2-4x)$	d^2/dx^2 for $(x^2+3x)/(x^2-4x)$
find the max of $4 - x^2$	find the min of $x^2 - 4$
critical values: solve $d/dx (x^3 - 5x + 3) = 0$	inflection of $x^3 + 9/2x^2 - 12x + 11$
hypercritical values: solve $d^2/dx^2 (x^3 - 5x + 3) = 0$	min $x^{(5/3)} - 5x^{(2/3)} + 3$ from $x=0$ to 5
antiderivative of $x^5 - 3x^2 + 2$	integrate $x^5 - 3x^2 + 2$

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COURSE OUTLINE

Class Date	Quizzes	Sections	HW Problems
08/27		1.1, 1.3	1.1: 85, 87, 89. 1.3: 11, 13, 15, 29, 31, 37, 49, 51, 69, 71, 73, 75.
08/29		1.4	1.4: 7, 9, 23, 27, 33, 37, 41, 43, 57, 59.
09/03	Q1 (1.3)	1.5	1.5: 29, 31, 35, 39, 43, 51, 53, 65, 67.
09/05		1.6	1.6: 7, 13, 17, 21, 29, 37, 47, 51, 83, 85.
09/10	Q2 (1.5)	2.1	2.1: 33, 37, 39, 41, 43, 51, 53, 59, 73, 77, 91.
09/12		2.2	2.2: 17, 19, 33, 35, 37, 39, 41, 47, 81, 83.
09/17	Q3 (1.6)	2.4	2.4: 21, 25, 35, 41, 81, 83.
09/19		2.5	2.5: 11, 15, 19, 23, 33, 37, 41, 45, 49, 53, 95, 97.
09/24	Q4 (2.1)	Practice	
09/26		Test 1	Sections 1.3-2.5
10/01		2.7	2.7: 9, 13, 17, 21, 37, 43, 45.
10/03	Q5 (2.5)	3.1	3.1: 13, 17, 27, 29, 31, 35, 37, 43, 47.
10/08		3.2	3.2: 7, 11, 13, 15, 19, 25, 31, 35, 47, 51, 55, 67, 71, 75.
10/10	Q6 (2.7)	3.3	3.3: 9, 11, 13, 15, 19, 25, 31, 33, 47, 51, 53, 55, 61, 63, 65, 67, 69, 75, 79, 81, 85, 93, 95, 97.
10/15		<i>Fall Break</i>	
10/17	Q7 (3.2)	3.4	3.4: 9, 11, 13, 21, 25, 29, 33, 37, 39, 41, 45, 49, 53, 57, 59, 61, 79, 83, 85, 91, 95.
10/22		3.7	3.7: 1, 3, 9, 11, 13, 17, 19, 21, 25, 27, 31, 33, 35, 39, 43, 47, 49, 51, 53, 59, 67, 69, 83, 85, 87, 89, 91.
10/24	Q8 (3.4)	4.1	4.1: 27, 29, 33, 37, 41, 85, 87, 91, 93, 95, 97.
10/29		4.2	4.2: 1, 3, 5, 17, 19, 21, 23, 25, 27, 31, 33, 35, 37, 39, 87, 89, 91, 93, 97.
10/31	Q9 (3.7)	Practice	
11/05		Test 2	Sections 3.1-4.2
11/07		4.5	4.5: 19, 21, 23, 25, 27, 35, 39, 43, 45, 67, 71.
11/12	Q10 (4.1)	4.6	4.6: 9, 11, 19, 21, 25, 27, 29, 33, 37, 39, 41.
11/14		5.1	5.1: 3, 7, 9, 11, 17, 21, 23, 43, 45, 49, 51, 69, 81, 83, 85, 91.
11/19	Q11 (4.5)	5.2	5.2: 9, 11, 13, 15, 17, 19, 23, 27, 31, 35, 39, 59, 61, 77, 79, 81, 83.
11/26		5.4, 5.5	5.5: 13, 17, 21, 25, 33, 39, 45, 69, 71, 75, 79, 81.
11/28		<i>Thanksgiving</i>	
12/03	Q12 (5.1)	Practice	
12/05		Practice	
12/17		Final exam	Cumulative