

Fall 2015 Syllabus: Calculus with Applications to Business and Finance

CRN: 56737

Credit Hours: 5

MATH 1730-910

Online

5:45 – 7:00 pm T

Recitation -911

Online

5:45 – 7:00 pm R

Instructor: Dr. David Gajewski

Office: UH 3014

Course web site: <http://math.utoledo.edu/~dgajews/1730>

Office Hours: To be determined, and by appointment

Phone: 530-3253

E-Mail: david.gajewski@utoledo.edu (note: not @rockets.utoledo.edu)

Recitation Instructor: Reetam Majumder

Office: UH 2280D

Office Hours: To be determined, and by appointment

E-Mail: reetam.majumder@rockets.utoledo.edu

CLASS MEETINGS: 5 hours per week including lecture, lab, and recitation time.

REQUIRED TEXTBOOK/SOFTWARE:

Calculus and Its Applications, A Custom Edition for the University of Toledo, by Bittinger, Ellenbogen, and Surgent, packaged with MyLabsPlus (ISBN: 9781323149348, Pearson 2016). Students may purchase the software code from the bookstore with or without a hard copy of the text – note that the software includes an electronic version of the textbook. Alternatively students may purchase the software alone directly from the publisher (instructions on how to do so will be given on the first day of class).

CATALOG DESCRIPTION

An introduction to differential and integral calculus. Topics include limits, derivatives, maxima/minima, indefinite and definite integrals with an emphasis on business applications and technology use.

PREREQUISITES

Math 1320 with minimum grade of D- or Math 1260 with minimum grade of D- or College Algebra Placement 12 or ALEKS placement 61 or ACT Math 22 or SAT Mathematics 520.

CLASS STRUCTURE

Students will meet one time per week with their instructor for 75 minutes. Links to each class or recitation will be on the main course website and may be sent by email a few minutes before class begins. To join the class, simply click on the link and follow the emailed instructions. During the live-streamed class, students will be periodically asked to answer multiple choice questions to contribute to their attendance/participation grade. If a student is unable to attend a live lecture, the student may view the video of the lecture later, but will be required to turn in an alternate assignment (electronically via Blackboard or email) within one week of the missed lecture in order to reclaim the points lost for not completing the multiple choice questions during the live lecture. In addition to the live streamed class, an additional 75 minutes of video lecture will be posted each Friday which students will be required to watch over the weekend and do a related assignment on to test their understanding of the video.

RECITATION/LAB

Students will meet once per week for 75 minutes with their recitation instructor. During this time there may be presentation of new material, additional examples to supplement the lecture,

the opportunity to ask questions, and weekly quizzes. Several times during the semester this time will be used for a technology lab in which various technological utilities will be introduced to aid in understanding of the course material. Note that attendance at all recitation/lab sessions is mandatory and that the technology labs will be graded.

GRADING

Grades will be based on the following scale:

% Score	Grade
90-100	A range
80-89	B range
70-79	C range
60-69	D range
<60	F

(note that minus and plus grades will be awarded for grades at the lower and upper ends of the given ranges respectively, and that there are no A+ grades at The University of Toledo).

Grades are calculated as follows

Test 1	Monday, September 28, 2015	15%
Test 2	Monday, October 26, 2015	15%
Test 3	Monday, November 23, 2015	15%
Quizzes	most weeks during recitation	10%
Final Exam	Monday, December 14, 2015 , 8-10AM	25%
Homework		15%
Participation/Attendance		5%
Total		100%

If it is to your advantage, your lowest test score will be replaced with your final exam score, making the final exam worth a total of 40% of your grade. Note that tests earning failing grades due to academic dishonesty are not eligible for replacement with the final exam.

ASSESSMENT OF LEARNING

Student learning will be assessed using graded online and written homework, quizzes, a participation/attendance score, three tests and a final examination. The department writes all tests and the final exam. The final exam is comprehensive and mandatory. The learning objectives being assessed are listed at the end of the syllabus.

RESOURCES

The Mathematics Learning and Resource Center that is located in the basement of Carlson Library provide Mathematics tutoring. Hours may be found at <http://www.utoledo.edu/success/lec/tutoring/index.html>.

ATTENDANCE

Students are expected to attend all classes and recitations from beginning to end and attendance will be tracked.

If you are a distance student who lives too far from campus to commute for tests and the exam, you will need to contact Learning Ventures during the first 3 weeks of class to make arrangements for proctored testing on the test and final exam dates at a test site near you. You will be required to fill out an electronic form to formalize your request for proctored testing. Note that it is your responsibility to make these arrangements. Information on proctored testing is located at <http://www.utdl.edu/lv/proctor/student.php>

If you are a student who can commute to campus but has a conflict with the test and exam schedules (for example you have class or work at that time) please contact me during the first 3 weeks of class so we can plan an alternate schedule for your tests.

TESTS AND FINAL EXAM

Each test will include only material covered since the previous test. The final exam will cover the entire course, and is mandatory for all students. To receive full credit on any test, homework or exam question, you must show a complete solution. Answers without work will not be given credit. All tests and the final exam are written by the department. Note that the final exam will be held on **Monday, December 14, 2015, 8-10AM** (Location to be announced.)

QUIZZES

Quizzes will be given during the lab/recitation most weeks. Your lowest quiz score will be dropped.

HOMEWORK

Homework will be assigned and graded online using MyMathLab, which may be accessed via Blackboard or by going to utoledo.mylabsplus.com. Problems may be worked online many times to master the material. In addition there will be written problems to turn in also. Homework will be due 1 week after it is assigned. Late online homework will be eligible for 60% credit, as long as it is submitted by the day of the final exam. Written homework must be submitted electronically as a pdf through the Blackboard system. Instructions on how to do this will be given during the first week of class. Late written homework will be accepted for 50% credit up to one week late. If an excused absence results in late homework, the homework will not be penalized for being late, as long as it is completed as soon as possible following the absence. You are responsible for keeping track of test, exam, and homework due dates.

PARTICIPATION

Your participation grade will be determined by your attendance and participation in classes and recitations, and completion of class and recitation activities which are not already part of the regular homework.

CALCULATOR

You will need either a basic scientific or graphing calculator (non-CAS models such as the TI-83 or TI-84 are acceptable for this course). CAS graphing calculators may not be used during tests or the final exam – examples of those not allowed are the TI-89 or TI-92 or the TI-Nspire CAS. For more details on which calculators we allow and disallow on tests, quizzes and exams, refer to <http://www.actstudent.org/faq/calculator.html>.

MYMATHLAB TECHNICAL SUPPORT

Any technical problems with the course software should be directed to the 24 hour support line at: 888-883-1299.

MISSED CLASSES

If circumstances occur in accordance with “The University of Toledo Missed Class Policy” (found at http://www.utoledo.edu/facsenate/missed_class_policy.html) and result in a student missing a quiz, test, exam or other graded item, the student must contact the instructor in advance by phone, e-mail or in person, provide official documentation to back up his or her absence, and arrange to make up the missed item as soon as possible.

ACADEMIC DISHONESTY

Any act of academic dishonesty as defined by the University of Toledo policy on academic dishonesty (found at <http://www.utoledo.edu/dl/students/dishonesty.html>) will result in an F in the course or an F on the item in question, subject to the determination of the instructor.

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA)

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability - Americans with Disability Act Compliance](#).

ACADEMIC ACCOMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office](#).

NON-DISCRIMINATION POLICY

The University of Toledo is committed to a policy of equal opportunity in education, affirms the values and goals of diversity.

STUDENT PRIVACY

Federal law and university policy prohibits instructors from discussing a student's grades or class performance with anyone outside of university faculty/staff without the student's written and signed consent. This includes parents and spouses. For details, see the "Confidentiality of student records (FERPA)" section of the University Policy Page at <http://www.utoledo.edu/policies/academic/undergraduate/index.html>

MEDIA USE POLICY

Media produced by the course instructor are solely for class use by students currently registered for the course, and under no circumstances can they be posted, linked to, or made available for distribution or copying to any persons, institutions, or servers (for example, no portion of them may be downloaded and posted on YouTube or sent to friends). This includes media that appears on the course site and in VoiceThread. As the author of these teaching materials the instructor or university holds the copyright (though not to the commercial artworks contained within them), and the only authorized use by students is for the purposes of the course. Violating this policy constitutes a serious infraction of UT's computer use policy and may result in consequences up to and including expulsion from the University and legal action (both criminal and civil) from the various rights holders whose copyrights you may have infringed.

OTHER UNIVERSITY POLICIES

Refer to the student handbook at <http://www.utoledo.edu/studentaffairs/pdfs/handbook.pdf>

DROP/WITHDRAWAL

Last day to add or drop this class: Monday, September 7, 2015

Last day to withdraw from this class with a grade of W: Friday, October 30, 2015

CLASS SCHEDULE

		Number of Lecture Hours
Chapter	R Functions Graphs and Models	(3 hours)
	R.1 Graphs and Equations	0.5
	R.2 Functions and Models	0.5
	R.3 Finding Domain and Range	0.5
	R.4 Slope and linear functions	0.5
	R.5 Nonlinear Functions and Models	1.0
Chapter	1 Differentiation	(11 hours)
	1.1 Limits: A Numerical and Graphical Approach: <i>Limits</i>	1.5
	1.2 Algebraic Limits and Continuity: <i>Limits, Continuity</i>	1.5
	1.3 Average Rates of Change: <i>Rates of Change</i>	1.5
	1.4 Differentiation Using Limits of Difference Quotients: <i>Rates of Change, Derivative Definition, Tangent Lines</i>	1.5
	1.5 The Power and Sum-Difference Rules: <i>Derivative Formulas</i>	1.5
	1.6 The Product and Quotient Rules: <i>Derivative Formulas</i>	1.5
	1.7 The Chain Rule: <i>Derivative Formulas</i>	1.0
	1.8 Higher-Order Derivatives: <i>Higher Order Derivatives</i>	1.0
Chapter	2 Applications of Differentiation	(8 hours)
	2.1 Using First Derivatives to Find Max and Min Values: <i>Increasing/Decreasing, Extrema</i>	2.0
	2.2 Using Second Derivatives to Find Max and Min Values, <i>Increasing/Decreasing, Extrema, Concavity</i>	2.0
	2.3 Graph Sketching: Asymptotes and Rational Functions: <i>Increasing/Decreasing, Extrema, Concavity</i>	1.0
	2.4 Using Derivatives to Find Absolute Max and Min Values: <i>Extrema</i>	1.0
	2.5 Max-Min Problems: Business and Economic Applications: <i>Extrema</i>	1.5
	2.6 Marginals (Differentials omitted): <i>Marginal Analysis</i>	0.5
Chapter	3 Exponential and Logarithmic Functions	(5 hours)
	3.1 Exponential Functions: <i>Derivative Formulas</i>	1.0
	3.2 Logarithmic Functions: <i>Derivative Formulas</i>	1.0
	Applications: Uninhibited and Limited Growth Models:	
	3.3 <i>Continuous Compound Interest</i>	1.0
	3.4 Applications: Decay: <i>Continuous Compound Interest</i>	1.0
	3.5 The Derivatives of a^x and $\log_a x$: <i>Derivative Formulas</i>	1.0
	3.6 Elasticity of Demand (optional): <i>Elasticity</i>	
Chapter	4 Integration	(8 hours)
	Antidifferentiation: <i>Antiderivatives, Integrals and</i>	
	4.1 <i>Substitution</i>	2.0
	4.2 Antiderivatives as Areas: <i>Riemann Sums</i>	1.0
	4.3 Area and Definite Integrals: <i>Definite Integrals, Areas</i>	2.0
	4.4 Properties of Definite Integrals: <i>Areas, Average Value</i>	1.5
	4.5 Integration Techniques: Substitution: <i>Integrals and</i>	1.5

		<i>Substitution</i>	
	4.6	Integration Techniques: Integration by Parts (optional): <i>Integration by Parts</i>	
Chapter	5	Applications of Integration	(3 hours)
	5.1	Consumer Surplus and Producer Surplus: <i>Consumer/Producer Surplus</i>	1.5
	5.2	Applications of Integrating Growth and Decay Models: <i>Integrals and Substitution, Continuous Compound Interest</i>	1.5
	5.3	Improper Integrals (optional): <i>Improper Integrals</i>	
Chapter	6	Functions of Several Variables (optional)	
	6.1	Functions of Several Variables (optional)	
	6.2	Partial Derivatives (optional) : <i>Partial Derivatives</i>	
	6.3	Maximum-Minimum Problems (optional): <i>Optimization</i>	
	6.5	Constrained Optimization (optional): <i>Lagrange Multipliers</i>	
		Total Number of Lecture Hours	38.0

*The instructor reserves the right to change the content of the course material if he perceives a need due to postponement of class caused by inclement weather, instructor illness, etc., or due to the pace of the course

LEARNING OBJECTIVES

The successful Math 1730 student should be able to apply the following competencies to a wide range of functions, including piecewise, polynomial, rational, algebraic, exponential and logarithmic:

- Determine limits and discontinuities of functions.
 - Limits:** Determine limits analytically, numerically and graphically including one-sided limits and limits at infinity.
 - Continuity:** Analyze the limit behavior of a function at a point in its domain to determine if the function is continuous at that point. Determine intervals in which a function is continuous. Analyze and classify the discontinuities of a function.
- Compute derivatives
 - Derivative Definition:** Use the limit definition of the derivative to determine the existence and to find the derivative of a given function.
 - Derivative Formulas:** Find the derivative of a function by identifying and applying the appropriate derivative formula.
 - Higher Order Derivatives:** Find higher order derivatives.
- Interpret derivatives and apply them to a business environment.
 - Rates of Change:** Interpret the derivative as a rate of change.
 - Tangent Lines:** Find the slope of the tangent line to the graph of a function at a given point.
 - Increasing/Decreasing:** Use the first derivative to determine intervals on which the graph of a function is increasing or decreasing and to determine critical points of the function.
 - Concavity:** Use the second derivative to determine intervals on which the graph of a function is concave upwards or concave downwards and to determine points of inflection.
 - Extrema:** Find and classify relative extrema and, on a closed interval, absolute extrema of a function.
 - Marginal Analysis:** Solve applied problems including marginal analysis applications and

explain the relationship between marginal cost and average cost.

- **Elasticity:** Determine and interpret the elasticity of demand for a product (optional objective)

4. Find indefinite and definite integrals and apply them to business problems.

- **Anti-derivatives:** Construct anti-derivatives analytically.
- **Integrals and Substitution:** Find indefinite integrals using integration formulas and the method of substitution.
- **Integration by Parts:** Find indefinite integrals using integration by parts (optional topic)
- **Riemann Sums:** Estimate the numerical value of a definite integral using a Riemann sum (optional topic)
- **Definite Integrals:** Use the Fundamental Theorem of Calculus to evaluate definite integrals,
- **Areas:** Identify definite integrals of functions as the areas of regions between the graph of the function and the x-axis, and use definite integrals to calculate the area of the region under a curve and the area of the region between two curves.
- **Continuous Compound Interest:** Determine present value and future value for an investment with interest compounded continuously.
- **Average Value:** Determine the average value of a function on an interval (optional topic)
- **Consumer/Producer Surplus:** For given supply and demand functions find and interpret the consumer's surplus and the producer's surplus.
- **Improper Integrals:** Evaluate improper integrals and apply to business problems (optional topic)

5. Solve optimization problems using functions of two variables (optional set of objectives)

- **Partial Derivatives:** Compute partial derivatives of functions of two variables algebraically. (optional objective)
- **Optimization:** Determine critical points for functions of two variables and use the second derivative test to determine the nature of critical points of a function of two variables. (optional objective)
- **Lagrange Multipliers:** Use the method of Lagrange multipliers to determine extreme values of functions of two variables subject to constraints. (optional objective)