MATH 105: Applied Calculus

Summer 2012 Session C 3 credit hours

Instructor: Dr. Trent Kull

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Instructor's teaching schedule: MTWR, 8 - 10a
Owens 103

Office hours: By appointment.

Instructor website: http://faculty.winthrop.edu/kullt/

Modifications

The instructor reserves the right to make modifications to this syllabus. Students will be notified in class & by email.

Course content

This course will be an applied introduction to calculus in real-world contexts, with the intent of providing a sound, intuitive understanding of the basic concepts needed to pursue careers in business; economics; finance and investment; the life, health, and environmental sciences; the physical sciences; and the social sciences. We'll learn the techniques of differential and integral calculus without sacrificing mathematical accuracy, and view concepts intuitively and geometrically when possible.

Grades

To ensure that you receive a certain letter grade (or better), you must attain a minimum overall percentage. These minima are: A: 90; B: 80; C: 70; D: 60. Your grades will be posted to Blackboard throughout the semester.

Assessments

Date	*Event*	*Percentage*
Various	*Quizzes*	*20*
June 12	*Exam 1*	*20*
June 19	*Exam 2*	*20*
June 27	*Exam 3*	*20*
July 3	*Final Exam*	*20*

Attendance policy

The University Attendance policy as stated in the 2009-2010 catalog (http://www.winthrop.edu/uploadedFiles/recandreg/Catalogs/09-10/2009_10_catalog_Acad_Regs.pdf): if a student's absences in a course total 25 percent or more of the class meetings for the course, the student will receive a grade of N if the student withdraws from the course before the withdrawal deadline; after that date, unless warranted by documented extenuating circumstances as described in the previous section, a grade of F or U shall be assigned.

Text and materials

- Required Text: *Mathematics with Applications* Custom Edition for Winthrop University
- MATH105 students are expected to have at least a scientific calculator and are highly encouraged to have a graphing calculator.

Homework/quizzes

Expect daily homework assignments/quizzes to reinforce the lesson material and prepare you for exams. Expectations will be detailed during class, with notes added to the Blackboard site as appropriate.

Exams

These may be closed book, no notes, no computer, no cell phone, individual effort events.

Missed quiz/exam policy

I will not give make-up quizzes or exams for those missed. Instead, I'll use the following policy: For all quizzes and course exams, a missed event will result in a recorded zero score until the end of the course. At that time, the average score achieved on all other quizzes will replace a single missed quiz score, and the final exam score (percentage) will replace a single missed exam score. Note that all students must take the final exam for a grade. Moreover, once a student has been handed a quiz (exam), the event will be graded.

Students with disabilities

Winthrop University is dedicated to providing access to education. If you have a disability and need classroom accommodations, please contact Gena Smith, Coordinator, Services for Students with Disabilities (SSWD), at 323-3290, as soon as possible. Once you have your Professor Notification Form, please tell me so that I am aware of your accommodations. If you require special testing consideration for a disability, contact the SSWD and bring me the appropriate paperwork in a timely fashion.

Policies

1. Review the student code of conduct for university polices on academic misconduct. Academic misconduct will not be tolerated and will result in a failing grade on the assignment and/or in the course. The full handbook is available online at: (http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf)
2. All electronic devises (including cell phones) other than a calculator should be on silent and kept in your book bag or purse throughout class time unless otherwise instructed. (Note if you have some educational, health, or physical reason for an electronic device you must work with your professor to inform them of the accommodation.)
3. The University attendance policy is stated in the current catalog (http://www.winthrop.edu/recandreg/default.aspx?id=7380).

SU Deadline: June 7 **Withdraw deadline:** June 21

Course goals and alignment with the general education goals

The course meets the Quantitavive Reasoning requirement through the following goal alignment. Further when not used as the QR requirement, this course meets the Logic, Language, and Semiotics requirement through activities and requirements that require students to: (1) use logic and mathematical information to draw reasonable conclusions and (2) use the symbols and language of mathematics to communicate about problems and present solutions.

Course Goals	General Education Goals
Apply derivatives and integrations to real life problems	2.1 Solve mathematical problems of the type necessary for living in today's and tomorrow's world.
	2.3 Understand that quantitative analysis is important to almost every endeavor of humankind.
	3.2 Analyze and use a variety of information gathering techniques
Use calculus to analyze graphs of functions and to determine extreme values of functions.	2.1 Solve mathematical problems of the type necessary for living in today's and tomorrow's world.
	2.2 Make valid inferences from data.
	2.3 Understand that quantitative analysis is important to almost every endeavor of humankind.
	2.4 Understand the concept and application of quantitative relationships.
	3.1 Identify sound and unsound reasoning.
	3.2 Analyze and use a variety of information gathering techniques
Use derivatives to solve optimization problems and problems involving rates of change.	2.1 Solve mathematical problems of the type necessary for living in today's and tomorrow's world.
	2.2 Make valid inferences from data.
	2.3 Understand that quantitative analysis is important to almost every endeavor of humankind.
	2.4 Understand the concept and application of quantitative relationships.
	3.1 Identify sound and unsound reasoning.
	3.2 Analyze and use a variety of information gathering techniques
Demonstrate an understanding of what calculus is and how it compares with pre-calculus.	2.2 Make valid inferences from data.
Use limits to investigate the concept of derivatives via slopes of tangent lines to graphs.	2.2 Make valid inferences from data.
	2.4 Understand the concept and application of quantitative relationships.
	3.2 Analyze and use a variety of information gathering techniques
Use limits to investigate the concept of integration.	2.2 Make valid inferences from data.
	2.4 Understand the concept and application of quantitative relationships.
	3.2 Analyze and use a variety of information gathering techniques

For purposes of departmental and touchstone program assessment of student learning in this course, sections of the final exam will be tabulated for all students and cover the goals listed above. Individual tests and course grades may also be used as an indication of progress toward the above goals.

Key topics

- Limits: understanding & computing 2-sided limits, existence, nonexistence, properties, computational methods, functions that differ at a point
- One-sided and limits involving infinity: understanding & computing limits at infinity (horizontal asymptotes), infinite limits, limits involving piecewise functions
- Rates of change: computation, average / instantaneous rates of change, velocity
- Tangent lines and derivatives: understanding connection between slopes and rates, secant lines, tangent lines, derivative definition, using limits to compute, existence, technology
- Techniques for finding derivatives: notation, constant / power / scalar multiple / sum /difference rules
- Derivatives of products and quotients: computing
- The chain rule: computation of composite functions, notation, decomposition, generalized power rule
- Exponential and logarithmic derivatives: computation, algebraic properties, domain restrictions
- Continuity and differentiability: relationship, continuity at a point / on an interval
- Derivatives and graphs: analyze the shape, increasing / decreasing intervals, critical numbers, first derivative test, local extrema
- The second derivative: analyze, notation, higher derivatives, concavity, second derivative test, points of inflection
- Optimization: application, extreme value thrm, absolute extrema
- Antiderivatives: inverse relation, notation, power rule, general properties
- Integration by substitution: computation, differentials
- Area and the definite integral: geometric interpretation, total change, notation, infinite sums, technology
- The fundamental theorem of calculus: computational convenience, notation, properties, area
- Applications of integrals: application, area btwn curves
- Differential equations: initial value problems, general / particular solutions, initial conditions, separable equations
- Functions of several variables: familiarity, graphing, planes, surfaces, traces, level curves
- Partial derivatives: understanding, computation, limit definitions, notation, rates of change, second order partials.
- Multivariable extrema: determination, local extrema
- Lagrange multipliers: familiarity, multipliers, solving systems of equations, technology

Course Calendar

The following is a tentative guideline, as I want to keep the flexibility to modify the pace and add or remove topics as appropriate. Exams do not share this flexibility -- this will allow more effective planning by all.

Date	Chapter	Subject
June 4	11	Differential calculus
5	11	
6	11	
7	11	
12	Review, Exam 1	
13	11	Differential calculus
14	11	
15	12	Applications of the derivative
18	12	
19	Review, Exam 2	
20	13	Integral calculus
21	13	
25	13	
26	13	
27	Review, Exam 3	
28	14	Multivariate calculus
1	14	
2	14	
3	Final Exam	(Cumulative)