NEW MEXICO STATE UNIVERSITY

Department of Mathematical Sciences

Mathematics 192 - Calculus and Analytic Geometry II

3 credits

Information For Instructors

Catalog Description: Riemann sums, the definite integral, anti-derivatives, fundamental theorems, use of integral tables, numerical integration, modeling, improper integrals, series, Taylor polynomials.

Prerequisite: Grade of C or better in Math 191.

Text: *Single Variable Calculus (Early Transcendentals)*, Jon Rogawski, Freeman.

Objectives: The goals are to present the concepts of calculus, stressing techniques, applications, and problem solving, and emphasizing numerical aspects such as approximations and order of magnitude. Overall, the goals are to illustrate the power of calculus as a tool for modeling situations arising in physics, science, engineering and other fields. In fulfillment of these goals, this and later courses will stress topics such as polynomial approximation, setting up integrals, as well as the use of appropriate technology.

Midterm and Final Exams: This course is required to have a uniform common final exam. Math 192 will have two common midterm exams, to be held on Thursday of the 6^{th} and 12^{th} weeks of the semester, from 7-8:30pm. There will also be regularly scheduled makeup exams on Friday after each exam, from 4-5:30pm. The issue of any additional makeups will be left up to the instructors.

On-line homework: All sections of the course will assign a common set of homework problems, which should be available both in the textbook and on WebAssign. This is intended to be a minimal subset of all course assignments. Instructors are free to add problems to the assignment, and assign other work as desired, either from the book or on-line. Homework should be assigned liberally. However, unless it can be verified that students are responsible for the work they submit, on-line homework should not count for a high percentage of the course grade.

Lab Sections: The fourth hour will be staffed by graduate assistants, and will be run as a problem-solving session, focusing on the common on-line homework problems. This will provide somewhat uniform preparation for the common exams. More individual section work (e.g. projects, other homework) will be done in the hours the instructor

teaches. This will help to ensure that GAs running multiple sections are not overburdened.

Other means of assessment: Instructors are encouraged to use reading quizzes, short quizzes based on homework, and other means of assessing student work, especially early in the semester. This helps instructors to learn students' names quickly, to provide regular feedback, and to generate classroom discussion.

Projects: NMSU's Department of Mathematical Sciences has a strong tradition in discovery based learning, especially in calculus courses, including producing one of the MAA's all-time bestseller's "Student Research Projects in Calculus." Instructors are encouraged to give a few to several short projects during the semester. The department has resources for these projects (see the bookcase on the south wall of the reading room) and instructors are encouraged to work with coordinators in developing new or modifying existing projects. Care should be taken so that projects do not run up against exams.

Content: The course will cover the chapters 5-8 and 10 of *Single Variable Calculus*.

The following table provides a possible schedule for covering topics, administering exams and projects, and so on. Instructors are encouraged to provide students with a week by week schedule of topics with dates for midterms and/or projects, prepared in consultation with the course coordinator. Instructors should consider the topics for in-class projects, as well as the actual dates of fall break and Thanksgiving or spring break, before the semester so that time can be allotted appropriately on the syllabus.

Week	Sections	Notes
1	5.1-5.2	Approximating and Computing Area, The Definite Integral
2	4.9, 5.3, 5.4	Antiderivatives, The Fundamental Theorem of Calculus
3	5.5-5.7	Net or Total change, Substitution
4	5.8, 6.1-6.2	Exponential Growth and Decay, Area Between Two Curves, Density and Average Value
5	6.2, 6.3 (6.4 optional)	Volume, Volumes of Revolution, Shells (optional)
6	Review, 6.5	EXAM 1
7	6.5, 7.1,7.2	Work and Energy, Numerical Integration, Integration by Parts
8	7.2-7.4	Integration by Parts, Trigonometric Integrals, Trigonometric Substitution
9	7.4, 7.7	Trigonometric Substitution, Improper Integrals
10	8.1 or 8.2 or 8.3, 8.4*	Arc Length or Fluid Pressure and Force or Center of Mass, Taylor Polynomials
11	8.4, 10.1	Taylor Polynomials, Sequences
12	Review, 10.2	EXAM 1
13	10.2,	Infinite Series, Convergence Tests, Power Series

	(10.3, 10.4 and 10.5)**, 10.6	
14	10.7, review	Taylor Series
15	FINAL EXAM	

* 8.4: Spend a good amount of time on this material. Make the emphasis of this section
  - Writing Taylor polynomials and finding a formula for the nth term,
  - Approximating f(x) at a given value of x and given value of n and using the error bound to find the associated maximum error
  - Finding the value of n required for a given error

** There is not enough time to cover all the convergence tests in the text. At a minimum, students should be expected to use the divergence test, geometric series test, alternating series test and ratio test. Other tests can be presented if time allows.

Revised by Debra Zarett, May 2010

Approved by the Undergraduate Curriculum Committee, May 2010