

# Calculus II

MAT 1226

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**University and Departmental Mission:** Seattle Pacific University seeks to be a premier Christian university fully committed to engaging the culture and changing the world by graduating people of competence and character, becoming people of wisdom, and modeling grace-filled community. The mathematics department at Seattle Pacific University seeks to provide excellent instruction to enable our students to be competent in the mathematics required for their chosen fields, and to share our expertise with the community through service and leadership. Hence, common goals for students in mathematics courses include 1) becoming competent in the topics covered in the course, 2) demonstrating skills and attitudes which contribute to professional, ethical behavior, 3) the ability to communicate mathematically, in both written and verbal form, and 4) learning to appreciate the beauty and utility of mathematics.

**Course Objectives:** This course continues the study of differential and integral calculus that was begun in MAT 1225. The primary aims of the course are to help students develop new problem solving and critical reasoning skills and to prepare them for further study in mathematics, the physical sciences, or engineering. By the end of the course, students should be able to

- differentiate, integrate, and solve problems with exponential, logarithmic, and inverse trig functions;
- compute complicated integrals using a combination of substitutions, algebraic and trigonometric manipulation, partial fractions, and parts;
- recognize and compute improper integrals;
- sketch and analyze curves given parametrically;
- graph curves in polar coordinates;
- compute areas and arc lengths using rectangular and polar coordinates;
- compute partial derivatives;
- compute multiple integrals using a variety of coordinate systems;
- apply integration to several types of physical problems; and
- use a computer program to effectively to explore and solve calculus problems.

In addition to the specific skill-oriented objectives above, students should

- have improved skills at problem solving and critical thinking: at dissecting a complex problem, determining steps in its solution, finding the solution, and testing whether it is reasonable;
- be able to provide clear written explanations of the ideas behind key concepts from the course;
- appreciate mathematics as part of the language of science and as a study in itself; and
- have fun accomplishing all of these objectives, even if the material is difficult and takes a lot of time and effort.

**Office Hours:** You are strongly encouraged to drop by my office to ask questions, discuss problems, and just to get to know me better. My tentative office hours for the quarter are 1:00-1:50 on Monday, Tuesday, Wednesday, and Thursday. I will also be available in the math lab 3:00-4:30 on Thursday and 12:30-1:30 on Friday. Finally, I will usually be available for questions immediately after class. If you are unable to meet with me at these times, I am available at other times by appointment. I also maintain an “open door” policy at my office – any time that my door is open, you are welcome to drop in to talk to me, even if it is not during my scheduled office hours.

**Textbook:** *Calculus*, 5<sup>th</sup> edition, by James Stewart. See the schedule at the end of this syllabus for details of the topics to be covered. Several supplements, including solutions manuals and student study guides are also available through the bookstore for the textbook.

## Grading and Course Expectations

**Exams:** There will be three in-class midterms and a cumulative final exam. The midterms are tentatively scheduled for April 19, May 11, and June 1. The final exam will be Wednesday, June 9 from 1:00 to 3:00.

Most questions on the exams will be similar to exercises from the homework. You will also be expected to be able to state some definitions and to provide explanations of some of the key ideas of the course.

**Homework:** The only way to truly learn calculus is to work as many exercises as possible. There will be homework assignments given virtually every day. Homework must be turned in at the beginning of class on the day it is due; *homework will not be accepted once class has started*. Your work must be neat and easily readable or you will receive NO credit. You must show all of your work – a correct answer with no justification will also be worth NO credit (particularly for odd problems with answers in the back of the book...).

I strongly encourage you to come to my office to ask me questions about the homework. You are also encouraged to work with other students on the homework, but you must individually write up and turn in your own solutions. You are required to list on your paper all other individuals that you worked with or that assisted you in any way with the assignment – failure to do so will be considered cheating (turning in someone else’s work as your own).

**Quizzes:** There may be occasional short quizzes (typically unannounced). The problems on the quizzes will generally

be *very* similar to exercises from the homework assignment that was collected that day.

**Attendance:** Attendance will not be taken, but if you expect to succeed in this course, it is essential that you come to class every day. Unless you have an acceptable excuse *and* make special arrangements with me *before* class begins, missing an exam or quiz or failing to turn in an assignment on time will result in a grade of zero. Late homework will not be accepted for any reason and no make-up quizzes will be given, but if you have an acceptable excuse and contact me before class, I will drop the homework or quiz score.

**NOTE:** Things such as oversleeping, lack of preparation, or sneezing twice are NOT acceptable excuses. Acceptable excuses include a death in your immediate family or a *serious* illness, and *you are responsible for providing me with documentation of your excuse.*

**Final Grades:** Homework and quizzes will be worth a combined total of 150 points. Your three lowest homework or quiz scores will be dropped at the end of the quarter. The 3 midterms will be worth 100 points each and the final exam will be worth 150 points. With a total of 600 points, course grades will be based on the following scale:

	560-600	A	540-559	A-	
520-539	B+	500-519	B	480-499	B-
460-479	C+	440-459	C	420-439	C-
400-419	D+	360-399	D	Below 360	E

A grade of I (incomplete) is only given for non-academic reasons such as a severe illness that prevents you from completing the course. You must have a passing grade on the material that you have completed in order to receive an incomplete.

**Academic Dishonesty:** Academic dishonesty includes copying another's work on an exam, preparing for an exam by using test questions from a stolen exam, bringing concealed answers to an exam, turning in another person's work as your own, committing plagiarism, or assisting another student in cheating. The minimum penalty for cheating or plagiarism in any form will be a zero for the assignment or exam in question. In addition, all students have an obligation to make efforts to prevent other students from cheating and to report incidents of cheating or plagiarism. Further details regarding SPU's academic dishonesty policies can be found on p. 50-51 of the 2003-2004 SPU Undergraduate Catalog.

### Additional Notes:

**Calculators & Computers:** Calculators will be permitted on all exams. Any basic scientific calculator or a graphing calculator such as the TI-81, TI-82, or TI-85 will be allowed. However, calculators which are capable of symbolic manipulation (such as the TI-89 or TI-92) are *NOT* permitted. If you have any doubt as to whether or not your calculator is acceptable, please ask me as soon as possible.

Some use of the computer software LiveMath will be required as a part of homework assignments.

**E-mail:** All SPU students have an SPU e-mail address. I will occasionally make use of these SPU e-mail addresses to send information to all members of the class, so you should check your e-mail regularly. If you do not use your SPU e-mail account, there is a utility available through Banner to set up your SPU e-mail account to forward messages to some other e-mail address. I strongly recommend doing this so that you do not miss any important messages.

Please note that while it can be a great tool for quick communication, *e-mail is rarely a good substitute for face-to-face conversations and is very poorly suited for answering mathematical questions.* When you come to my office to ask me questions, I engage you in a discussion about the problem, ask questions about what ideas you have for approaching the problem, explore various possible approaches (and what goes wrong with some of them), etc. In the process, I can usually find out precisely where your difficulties lie and help you to learn how to get past them. Such a conversation is impossible by e-mail. Furthermore, typing and e-mailing mathematical symbols is very time consuming, and the resulting equations in the e-mail e-mails often come out garbled (or even completely missing) due to substituted fonts or problems with the wide variety of e-mail programs and web browsers that people use.

**Students with Disabilities:** Students with disabilities need to contact Disabled Student Services in the Center for Learning to request academic accommodations. Disabled Student Services sends letters out to all your professors indicating the appropriate accommodations for the classroom based on your disability. Once you have done this, you should also make an appointment to meet with me as soon as possible to discuss the details of how we will implement the accommodations in this course.

**Modifications to the course requirements can be made at any time. It is *your* responsibility to know all course requirements as described here or announced in class.**

**Tentative Course Schedule:** The table below provides a listing of topics that I plan to cover from the text. The exact dates on which we cover material will almost certainly vary somewhat from this list. Also, topics may be added to or removed from this list at any time.

Date	Section
3/29	5.2, 5.3 Area Functions and the Fundamental Theorem of Calculus
3/30	5.5 The Substitution Rule
3/31	6.1 Area between Curves
4/1	6.2 Volumes
4/2	7.2* The Natural Logarithmic Function
4/5	7.2* The Natural Logarithmic Function
4/6	7.1 Inverse Functions
4/7	7.3* The Natural Exponential Function
4/8	7.4* General Logarithmic and Exponential Functions
4/9	<b>No class: Good Friday half day</b>
4/12	7.5 Inverse Trigonometric Functions
4/13	7.6 Hyperbolic Functions
4/14	7.7 Indeterminate Forms and L'Hôpital's Rule
4/15	8.1 Integration by Parts
4/16	Review
4/19	<b>Exam #1</b>
4/20	8.2 Trigonometric Integrals
4/21	8.3 Trigonometric Substitution
4/22	8.4 Integration of Rational Functions by Partial Fractions
4/23	8.5 Strategy for Integration
4/26	8.6 Integration using Tables and CAS
4/27	8.7 Approximate Integration
4/28	8.8 Improper Integrals
4/29	9.1 Arc Length
4/30	9.2 Area of a Surface of Revolution
5/3	9.3 Applications to Physics and Engineering
5/4	11.1 Curves Defined by Parametric Equations
5/5	11.2 Calculus with Parametric Curves
5/6	11.3 Polar Coordinates
5/7	11.4 Areas and Lengths in Polar Coordinates
5/10	Review
5/11	<b>Exam #2</b>
5/12 & 5/13	15.1 Functions of Several Variables
5/14	15.2 Limits and Continuity
5/17	15.3 Partial Derivatives
5/18 & 5/19	16.1 Double Integrals over Rectangles
5/20	16.2 Iterated Integrals
5/21	16.3 Double Integrals over General Regions
5/24	16.4 Double Integrals in Polar Coordinates
5/25	16.5 Applications of Double Integrals
5/26 & 5/27	16.7 Triple Integrals
5/28	Review
5/31	<b>No class: Memorial Day</b>
6/1	<b>Exam #3</b>
6/2	16.8 Triple Integrals in Cylindrical and Spherical Coordinates
6/3	Review
6/4	Review
6/9	<b>Final Exam 1:00-3:00</b>

**“The chief aim of all investigations of the external world should be to discover the rational order and harmony which has been imposed on it by God and which He revealed to us in the language of mathematics.”**

Johannes Kepler (1571-1630)