Instructor: Mark Booth
Phone: 206-6464 x 76081, 489-4884
Day/Time M, W 530-745p
Section: 12573
Room: E3-303
Email: mark.booth@pima.edu
Use MAT 220 as the subject line of any e-mail message you send me.

Website: http://ecc.pima.edu/~mbooth

Prerequisite: C or better in MAT 151 and 182 or MAT 187 or satisfactory score on math assessment

Description: Introduction to analytical geometry and calculus. Includes limits, continuity, differentiation and integration of algebraic and basic trigonometric functions and applications of differentiation and integration

Textbook: Calculus (Single Variable), 4th, Hughes-Hallett et al. (Wiley, 2005)

Information:

This is a first course in calculus, intended to prepare you for further study in calculus and for a variety of engineering and physics courses, and fulfills the mathematics general education requirement. Experience shows that success in MAT 220 requires an average minimum commitment of 24-30 hours per week of quality study time outside of class. Course topics include functions, graphs and tables, limits, derivatives and integrals. The Rule of Four, which means that concepts are expressed graphically, numerically, analytically and verbally, will be applied whenever possible. The use of a graphics calculator is fundamental to this course.

Accommodations for Students with Disabilities:

Pima Community College strives to comply with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. Reasonable accommodations, including materials in an alternative format, are available to qualified students with appropriate disability documentation. To obtain accommodations, a student must be registered with a campus Disabled Student Resource (DSR) office. The East Campus DSR Office phone number is 206-7699. All disability-related information will be kept confidential.

Course Objectives:

1. Determine slope of a line, equation of line, apply parallel and perpendicular properties, be able to test for symmetry with respect to the origin, the x-axis, and the y-axis, and find the distance between two points.
2. Determine equations of a circle, ellipse-major axis, minor axis, foci.
3. Determine if a relation is a function and find its domain, range, and inverse.
4. Determine the average rate of change or the difference quotient.
5. Evaluate right and left hand limits for rational and multipart functions, and functions involving radicals.
6. Determine when a right or left hand limit is infinite in a positive or negative sense.
7. Apply the definitions and the limit theorems to evaluate finite and infinite limits.
8. State the definitions of the derivative and use it to find derivatives of rational functions and functions involving square roots.
9. Interpret the derivative as a slope of a tangent line, and use the derivative to find equations of tangent lines to curves.
10. State the definitions of continuity at a point, and apply the definition and the continuity theorems to determine at which point a function is continuous.
11. Determine from a graph whether a function is continuous and whether it is differentiable.
12. Apply the basic differentiation rules to find derivatives of polynomial functions.
13. State and use the product rule in finding derivatives.
14. State and use the quotient rule in finding derivatives.
15. State and use the chain rule to find derivatives of composite functions and radicals.
16. Find second and higher order derivatives and use them to solve problems involving velocity and acceleration.
17. Find derivates using the technique of implicit differentiation.
18. State Rolle's Theorem and the Mean Value theorem and show that it holds on a given interval and find the number in the interval which is guaranteed by the theorem.
19. Find the critical numbers of a function and the intervals on which the function is increasing and decreasing.
20. Find the local extrema for a given function.
21. Use the second derivative test to verify the maximum and minimum points.
22. Solve word problems which involve maxima and minima of a functional relationship.
24. Determine the indefinite integral and it's constant, if possible. State the definition of the definite integral and apply the fundamental theorem of calculus to evaluate them.
25. Solve integration by the u-substitution method.
26. Use summation and the definite integral to determine the area under a curve.
27. Find the areas between curves by setting up and evaluating the proper integrals.
28. * Determine the volume of a solid by the disk method.
29. * Determine the volume of a solid by the shell method.
30. * Determine the arc length of a plane curve.
31. * Determine the area of a surface of revolution.
32. * Solve work problems using the definite integral. (spring constants)
33. * Solve problems involving fluid pressure.
Course Outline:

I. The Cartesian Plane and Functions
   A. Graphing equations of lines
   B. Slope
   C. Distance formula
   D. Circles
   E. Ellipses
   F. Functions

II. Limits and Continuity

III. Differentiation
   A. Derivative as the slope of a curve or as a rate of change
   B. Rules for differentiation

IV. Differentiation and Curve Sketching
   A. Rolle's theorem
   B. Mean value theorem
   C. Increasing and decreasing functions
   D. Concavity
   E. Second-derivative test
   F. Curvature
   G. Curve sketching

V. Applications of Differentiation
   A. Extrema
   B. Related rates
   C. Velocity
   D. Acceleration
   E. Differentials
   F. * Derivative in economics

VI. Integration
   A. Indefinite integral
   B. Definite integral
   C. Area under a curve
   D. Fundamental theorem of calculus

VII. Determining the Volume of a Solid by the Disk Method

VIII. *Determining the Volume of a Solid by the Shell Method

IX. * Determining the Arc Length of a Plane Curve

X. * Determining the Area of a Surface of Revolution

*Optional for Consortium Calculus

Attendance:

Attendance affects your performance, and thus your course grade. Daily attendance is expected, so if you are not going to be in class you should notify the instructor prior to class. If you are absent for any reason, you are still responsible for all material covered in class and you should contact a classmate to learn what you have missed, since lecture and
other activities cannot be repeated for you during office hours or at any other time. **Note that your absence from class does not change the due date of any assignment.** Class begins at the scheduled time. As a courtesy to the instructor and your fellow classmates, please be on time. If you are unavoidably late, find a seat in the back near the door. Similarly, if you find it necessary to leave class early, sit near the door.

**Fall 2006 Calendar and Important Dates:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 23</td>
<td><strong>FALL CLASSES BEGIN (Traditional 16-week Semester)</strong></td>
</tr>
<tr>
<td>Aug 29</td>
<td><strong>FALL: Registration Ends; End of Add Period for Classes Beginning August 23</strong></td>
</tr>
<tr>
<td>Sep 4</td>
<td><strong>Labor Day Holiday (College Closed)</strong></td>
</tr>
<tr>
<td>Sep 5</td>
<td><strong>FALL: Traditional 16-week Semester - Drop/Refund/Audit Deadline</strong></td>
</tr>
<tr>
<td>Oct 6</td>
<td><strong>45th Day (Census) of the Semester</strong></td>
</tr>
<tr>
<td>Nov 6</td>
<td><strong>FALL: 16-week Traditional Semester - Withdrawal Deadline</strong></td>
</tr>
<tr>
<td>Nov 10</td>
<td><strong>Veterans Day - Observed (College Closed)</strong></td>
</tr>
<tr>
<td>Nov 13</td>
<td><strong>SPRING REGISTRATION - ContinuingReturning Students till January 22 2007</strong></td>
</tr>
<tr>
<td>Nov 23-26</td>
<td><strong>Thanksgiving Holiday (College Closed)</strong></td>
</tr>
<tr>
<td>Nov 27</td>
<td><strong>SPRING REGISTRATION - New Students till January 22 2007</strong></td>
</tr>
<tr>
<td>Dec 8-14</td>
<td><strong>FALL: Final Exam Week</strong></td>
</tr>
</tbody>
</table>

**Unit Exams** ......................................................... 60% of grade

There will be five unit exams. Most, but not all, exam problems will be similar to those done in the homework; unfamiliar problems will require you to use your knowledge of calculus in a new or different way. In other words, you are expected to think, not just remember, when taking an exam. Your lowest exam score will be dropped when course grades are computed at the end of the semester. Exams 1, 2, 3, and 5 will be available to you in the Testing Center during a three-day window to be announced in class; Exam 4 will be a take-home exam. If you have a conflict with the exam schedule, you must notify me prior to the end of the exam window. No make up exams will be given; if you miss an exam, a score of 0 will be recorded for that exam.

**Testing Center Hours**

- Monday – Thursday: 8:15am – 7:00pm
- Friday: 8:15am – 4:30pm
- Saturday: 9:00am – 3:00pm

**Problem Assignments and Activities** ............................ 20% of grade

Homework will be collected weekly, generally on Monday, at the beginning of class. A problem from the homework may be discussed at any time except in class on the day on
which that problem is due. No late homework will be accepted without a coupon. Each late assignment coupon is good for the assigned problems from one text section only.

Final Exam. The comprehensive final exam is required. It will be given on Monday, Dec 11. You may bring one 8.5" by 11" sheet of notes to this exam, if you wish, and you will need your calculator.

The Course Grade

Your course grade will be computed as a weighted average, and will be assigned according to the following guidelines: 90% - 100%, A; 80% - 89%, B; 70% - 79%, C; 60% - 69%, D; and below 60%, F. For example, suppose the exam average is 76%, the homework and activities percentage is 91%, and the final exam score is 78%. The grade is calculated as follows: \(0.6(76) + 0.2(91) + 0.2(78) = 79.0\), which is a grade of C. No rounding will be used in this calculation. Questions you have about your grade must be discussed privately, and not in class or in front of others.

Notes on I, W, and Y

A grade of I (Incomplete) is given only in cases of documented serious illness or emergency at the end of the course, and only if the student has already completed at least 75% of the course work with a grade of C or better. If you decide to withdraw from this course (W), do so officially at the Registrar’s Office no later than November 6, 2006. A grade of Y (Instructor Withdrawal) may be requested from the instructor in writing before the final exam, and will not be awarded if the student takes the final exam. Be aware that a Y grade may negatively affect your financial aid status. If you stop participating in class, do not officially withdraw by April 10 and do not request and receive a Y, your grade will be computed as described above, with zeros entered for all missing grades.

Ethics and this Class

You are expected to abide by the Student Code of Conduct in all aspects of this course. Specifically, this means that you are expected to meet certain standards of behavior both in the classroom and outside it. Playing by the rules means living with the occasional setback, and doing the right thing often means more work, but ultimately success comes from doing what is honest and right. Cheating (that is, representing another person’s work as your own) is not only a violation of the code of conduct, it is also a breach of trust; it can be grounds for dismissal from class and a grade of F.

Suggestions

- Attendance and participation are crucial to success in this class. At least study the sections of the text to be discussed that day before you come to class. Be an active participant in class, take notes, ask questions, and get your money's worth.
• A study group of students all taking the same class can be an invaluable aid to learning mathematics. At the minimum, find somebody in this class whom you can call if you miss class, and with whom you can discuss math problems, even if it’s only over the phone or online.

• Find a tutor in the Math Center on whom you can depend to answer your questions. All tutors will expect that you have tried to work the problems before coming to them with questions about the problems - do not ever expect a tutor to do your homework for you.

• Do you have math or test anxiety? There are experts in the Counseling Office ready to help you overcome your fears. Don't wait - see one of them now. Do you suspect that you have a learning disability? See someone in the DSR office to find out.

• Mathematics is a skill that takes time and effort to learn. Read your text with a pencil in your hand, doing examples as you encounter them. When you are stuck, get help right away. Persist until solutions are clear and understandable to you.

**Note:** The instructor reserves the right to amend this syllabus at any time, should that become necessary.

<table>
<thead>
<tr>
<th>Month/Days</th>
<th>Sections</th>
<th>Month/Days</th>
<th>Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>August</strong></td>
<td></td>
<td><strong>April</strong></td>
<td></td>
</tr>
<tr>
<td>Wed 23</td>
<td>Intro, 1.1 – 1.2</td>
<td>Mon 23</td>
<td>4.2 – 4.3</td>
</tr>
<tr>
<td>Mon 28</td>
<td>1.3 - 1.4</td>
<td>Wed 25</td>
<td>4.5</td>
</tr>
<tr>
<td>Wed 30</td>
<td>1.5 - 1.6</td>
<td>Mon 30</td>
<td>4.6 – 4.7</td>
</tr>
<tr>
<td><strong>September</strong></td>
<td></td>
<td><strong>November</strong></td>
<td></td>
</tr>
<tr>
<td>Mon 4</td>
<td>Holiday</td>
<td>Wed 1</td>
<td>4.7 – 4.8</td>
</tr>
<tr>
<td>Wed 6</td>
<td>1.7 - 1.8</td>
<td>Mon 6</td>
<td>Review Exam 5</td>
</tr>
<tr>
<td>Mon 11</td>
<td>Review Exam 1</td>
<td>Wed 8</td>
<td>5.1 – 5.2</td>
</tr>
<tr>
<td>Wed 13</td>
<td>2.1 – 2.2</td>
<td>Mon 13</td>
<td>5.3 – 5.4</td>
</tr>
<tr>
<td>Mon 18</td>
<td>2.3 – 2.4</td>
<td>Wed 15</td>
<td>6.1 – 6.2</td>
</tr>
<tr>
<td>Wed 20</td>
<td>2.5 – 2.6</td>
<td>Mon 20</td>
<td>6.2 – 6.3</td>
</tr>
<tr>
<td>Mon 25</td>
<td>Review Exam 2</td>
<td>Wed 22</td>
<td>6.4</td>
</tr>
<tr>
<td>Wed 27</td>
<td>3.1 – 3.2</td>
<td>Mon 27</td>
<td>Review Exam 5</td>
</tr>
<tr>
<td><strong>October</strong></td>
<td></td>
<td><strong>December</strong></td>
<td></td>
</tr>
<tr>
<td>Mon 2</td>
<td>3.3 – 3.4</td>
<td>Wed 29</td>
<td>6.5</td>
</tr>
<tr>
<td>Wed 4</td>
<td>3.5 – 3.6</td>
<td>Mon 4</td>
<td>7.1</td>
</tr>
<tr>
<td>Mon 9</td>
<td>3.7 – 3.8</td>
<td>Wed 6</td>
<td>Course Review</td>
</tr>
<tr>
<td>Wed 11</td>
<td>3.9 – 3.10</td>
<td>Mon 11</td>
<td>Final Exam</td>
</tr>
<tr>
<td>Mon 16</td>
<td>Review Exam 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Student Information/Acknowledgement Form –Fall 2006
MAT 220, Calculus I, Section 12573

Last Name ________________________    First Name _____________________

Preferred Name: ____________________________

Phone number: Day                                                 Evening:
Email:

What was the last math class you took? When?

Major / Program of Study

What other time commitments do you have outside of this class?

Do you have the hour before or after class open?
Before?     After?

I have received, read and understood the syllabus and all policies for this course and I have made a time commitment to be successful in this course.

____________________________                                                    __________________
Your signature                                                                                     Today’s date