Course: Math 205   Submitting Campus: Kapiolani Community College

Title & Catalog Description:
Math 205 Calculus I (4) focuses on basic concepts, limits and continuity, techniques and applications of differentiation, introduction to integration.

UHM Equivalent Course (check one): [Only equivalent courses may be submitted for Fast Track review.]

X MATH 241

Symbolic Reasoning (FS) Hallmarks & Application Questions
Answer the following questions and submit the answers with this form and at least one course syllabus.
1. Student will be exposed to the beauty, power, clarity and precision of formal system. How will the course meet this hallmark?

The student will be learning Calculus, which is inherently powerful, beautiful, and precise.

2. Instructors will help students understand the concept of proof as a chain of inferences. How will instructors help students understand this concept?

Instructors will thoroughly explain proofs of some important mathematical theorems, including Rolle's Theorem and the Fundamental Theorem of Calculus. Students will be shown some methods of proving theorems of the form "w & f" such as "direct proof" and "proof via contradiction", and also be encouraged to try these methods to prove some statements involving Rolle's Theorem or the Mean Value Theorem.

3. Instructors will teach students how to apply formal rules or algorithms. How will instructors meet this hallmark?

In order for students to learn Calculus, they must learn to think their way through the solutions of problems. That is, when they solve problems, they must think about the definitions or theorems related to the problems and then apply these definitions or theorems in the process of solving the problems. It is a very important responsibility of instructors to teach and encourage students to do this.
4. Students will be required to use appropriate symbolic techniques in the context of problem solving, and in the presentation and critical evaluation of evidence. What symbolic techniques will be required and in what context? How will presentations and evaluations of evidence be incorporated into the course? Calculus is an important part of mathematics, which is inherently rich in symbolic content. Such content is unavoidable in the study of calculus.

5. The course will not focus solely on computational skills. What reasoning skills will be taught in the course?

See answer to 3 above. Students will use deductive reasoning to apply theorems and definitions to solve problems. Part of this process requires that the students understand theorems in the first place, which requires that the students completely understand the logic involved in statements such as For example, the students should learn that if the hypotheses of a theorem (in the form )are false, then the conclusion may be either true or false.

6. Instructors will build a bridge from theory to practice and show students how to traverse this bridge. How will instructors help students make connections between theory and practice?

Students will solve problems involving applications of the derivative that include velocity, acceleration, and other practical rates of change, for example: the rate of increase of a population of bacteria, the rate of change of the effectiveness of a drug, the rate of change of the temperature of an object, marginal cost and marginal revenue. Students will also apply differential calculus to solve optimization problems, such as finding the parameters that determine a container of minimum cost or a beam of maximum strength. Students will also solve problems involving applications of the definite integral that involve area. Other applications of the definite integral (to be studied in detail in second semester calculus) such as the work done by moving an object with a variable force, arc length, center of mass, liquid pressure, and the volume of a solid of revolution will be mentioned in class.

Required Signatures

Requested by Charles Matsuda, Chair Math/Science Department

Signature ______________________________
Date____________________

Approved by _______________________ Kapiolani Community College
Chief Academic Officer

Signature ______________________________
Date____________________
COURSE: Math 205
INSTRUCTOR'S OFFICE: xxxxxxxx
OFFICE PHONE: xxxxxxxx
OFFICE HOURS: xxxxxxxx

COURSE OBJECTIVES: This course covers the following main topics: limits; continuity; differentiation; applications of differentiation including curve sketching, Newton's Method, max-min problems, related rate problems; the definite integral; and the Fundamental Theorem of Calculus. Unfortunately, considering the topics that must be covered, there is a minimum of class time. Students should review topics as needed from Chapter 1 on their own. All sections in chapter 1 are important, and section 1.5 on functions is very important.

SUPPLEMENTAL LEARNING MATERIALS: A COMPLETE SOLUTIONS GUIDE, which contains solutions to all the problems in the text, is available on reserve in the library, for in-library-use only. Also, the K.C.C. library contains copies of several calculus texts and other related math texts.

HOUR EXAMS: There will be 4 hour exams. Questions on topics covered in chapter 5 will be included on the final exam.
IN ORDER TO AVOID RECEIVING A SCORE OF ZERO FOR AN HOUR EXAM, A STUDENT MUST NOTIFY THE INSTRUCTOR BEFORE THE EXAM IS GIVEN. A student could make such notification by calling my office and leaving a message. Such notification does not guarantee that a score of zero will not be given. The excuse must a good one and certainly be unrelated to the need to have more time to study for the test. ANY UNEXCUSED EXAM WILL BE SCORED AS ZERO AND NO MAKE UP EXAM WILL BE GIVEN. Instead, when your grade for the course is calculated, the final exam will be given a weight of 15% more than normal.

FINAL EXAM: There will be a cumulative final exam which will count 1/4 of the final grade. For the date and time of the final exam, see the Final Exam Schedule published in the Schedule of Courses.

NOTE: If your instructor is 15 minutes late, class will be automatically canceled. (Carefully check the time in such a situation. The classroom clocks are not dependable.) Any student who disappears without officially withdrawing will receive an F. It will be practically impossible to withdraw after the date for the last day for withdrawals that is published in the Schedule of Courses. Late withdraw forms will be approved only in cases of extreme personal tragedy. Incomplete (I) grades are reserved for students with serious illnesses (or incapacitation) near the end of the semester, eg. hospitalization.
MATH/SCIENCE DEPARTMENT POLICIES ON WITHDRAWALS AND INCOMPLETES:

1. WITHDRAWALS (W grade) - After the "last day for all withdrawals", which is found on the calendar in the schedule of courses, the instructor will sign withdrawals only in cases of extreme or unusual circumstances. Grade related excuses are unacceptable. Examples of extreme or unusual circumstances are a) a certified medical reason and b) a death in the immediate family.

2. INCOMPLETES (I grade) - Students must present the "Request for Incomplete" form prior to the last day of instruction. "I" grades will be given only to students who are achieving passing grades and are very close to completing the course. In addition, the student must have a very good reason for not being able to complete all the work on time. Examples of good reasons are the same as those listed under the withdrawal policy above.

STUDENT RESPONSIBILITIES: Class notes should be taken which reflect the thought process and reasoning demonstrated by the instructor. A good student should study at least 2 hours outside-of-class for each hour in class. Since Math 205 is a 4 credit course that meets 4 hours per week, this means that most students should study at least 8 hours per week. The studying should also be done PROPERLY. The student should spend considerable time thinking about new and old principles, concepts, definitions and theorems. Problems should not just be solved mechanically, and the student should not be satisfied merely the correct answer. The student should also make a list of all of his questions about problems, concepts, etc. before each class meeting. The student has a responsibility to himself and to the rest of the class to ask questions. This is a CRUCIAL responsibility.

MATH 205 -- ASSIGNMENTS

2.1 An introduction to limits
   all odds; 8, 10, 12, 26, 28, 30, 32, 34, 36
2.2 Techniques for evaluating limits
   all odds; 2, 4, 6, 26, 28, 30, 32, 36, 38, 54
2.3 Continuity
   all odds to 53; 2, 4, 6, 36, 38, 48
2.4 Infinite limits
   all odds; 6, 8, 28, 32, 34, 36, 38
2.5 Epsilon-delta definition of limits
   1, 3, 5, 7, 9, 11, 13, 15, 22, 29

*****Exam 1*****

3.1 The derivative and the tangent line problem
   all odds; 28, 30, 32, 34, 36, 40, 42, 48, 50
3.2 Velocity, acceleration, and other rates of change
   all odds; 12, 14
3.3 Differentiation rules for powers, constant multiples, and sums
   all odds; 44, 46
3.4 Differentiation rules for products and quotients
   all odds; 12, 14, 16, 28, 44
3.5 The Chain rule
   all odds; 42, 44, 56; supplementary handout with transcendental functions to differentiate
3.6 Implicit differentiation
   all odds to 39
*****Exam 2*****

4.1 Extrema on an interval
   all odds to 29; 2, 4, 6, 8, 10, 12, 14, 16, 35, 37
4.2 Rolle's Thm and the Mean Value Thm
   all odds
4.3 Increasing and decreasing functions and the 1st Derivative Test
   all odds to 49
4.4 Concavity and the 2nd Derivative Test
   all odds to 45; 2, 4, 6, 40, 42, 49

*****Exam 3*****

4.5 Limits at Infinity
   all odds to 57
4.6 A Summary of Curve Sketching
   all odds; 50, 52, 54
4.7 Optimization problems
   all odds
4.8 Newton's Method
   all odds to 17
4.9 Differentials
   all odds to 25
4.10 Business and Economic Applications
   all odds to 27 (optional)

*****Exam 4*****

5.1 Antiderivatives and Indefinite integration
   all odds to 37
5.2 Area
   all odds to 45; 49, 53, 57
5.3 Reimann Sums and the Definite Integral
   all odds
5.4 The Fundamental Theorem of Calculus
   all odds
5.5 Integration by substitution
   all odds
5.6 Numerical Integration
   5, 7, 21, 23, 25, 27

( Material in chapter 5 will be included on the final exam, with a
disproportionally high weight ( c 26%).)

Note: Kapiolani Community College is an Equal Opportunity/Affirmative Action
Institution. If you have a disability and have not voluntarily disclosed the
nature of your disability and the support you need, you are invited to contact
the Special Student Services Office, 734-9552 (V/TTY), Ilima 105, for assistance