MATH 01.130 Calculus 1 4 s.h.

This course begins with a discussion of functions, the limit concept, and continuity. The concept of a derivative is introduced and the student learns to differentiate algebraic functions, exponential functions, logarithmic and trigonometric functions. Differentiation is applied to the analysis of functions, extreme problems and to problems in related rates. The integral as the unit of a sum is linked to the anti-derivative by the Fundamental Theorem of Calculus and used to find areas. A graphing calculator is required for this course and so is the use of a computer software such as Mathematica. Students are expected to have completed an equivalent of (1701.122) Precalculus.

Objectives:

At the conclusion of his course students will be able to demonstrate the ability to (i) compute limits, (ii) differentiate and integrate polynomial, rational, exponential, logarithmic, and trigonometric functions, (iii) use differentiation to solve extreme and related rate problems, and (iv) use integration to find areas and volumes.

Contents:

1. Prerequisites for Calculus

   A brief review of functions and their graphs.

2. Limits and Continuity

   It is recommended that the emphasis here be on definitions and on intuitive understanding of concepts, through formal delta and epsilon proofs should be demonstrated.

3. Derivatives

   The derivative definition and rules for finding derivatives of polynomial, rational, exponential, logarithmic, trigonometric, and algebraic functions.

4. Logs and exponential functions

   Inverse functions, logs and exponential functions, derivatives of logs and exponential functions.

Implicit differentiation, related rates.

5. Analysis of functions and their graphs

   Increasing and decreasing functions, concavity, Relative extreme, First and 2nd derivative tests, Rolle's Theorem and the Mean Value Theorem.

6. Applications of Derivatives

   Applications of the derivative to maxima and minima, the relationships between distance, velocity, and acceleration.

7. Integration

   The definite integral is formally defined and the definition is used to evaluate the integral. The Fundamental Theorem of Calculus is proved and techniques for evaluation of both definite and indefinite integrals by means of the Fundamental Theorem is discussed. The process of integration by means of a change of variables is then introduced.

8. Applications of Definite Integrals

   Finding areas between two curves by the use of the definite integral.

Required materials:

Textbook: Calculus, Early Transcendentals, (Jon Rogawski,) 2008, W.H. Freeman and Company.

TI-89 graphing Calculator

Mathematica

Grading Proceedure:

1. 4-5 problems sets
2. 2-3 exams
3. Final exam (cumulative)

NOTE: If you fail to turn in a problem set due to an absence, you must provide proper documentation in order to turn it in after the due date.

NO EXCEPTIONS

Attendance policy:

Attendance is mandatory. Each student will be permitted a combination of 3 unexcused absences or lateness to class. Personal/medical emergencies are excused, but those due to transportation/ scheduling are not. A note explaining the reason for missing class must be presented immediately upon return.

Contact information:

I expect to be on campus approximately one hour prior to the start of class. If you need to contact me, this can be done by:

E-mail: richards6686@comcast.com
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