MATH 115 - Applied Calculus Course Outline

Approval Date: 05/20/2013
Effective Date: 08/01/2018

SECTION A

Unique ID Number	CCC000285813
Discipline(s)	Mathematics
Division	Mathematics
Subject Area	Mathematics
Subject Code	MATH
Course Number	115
Course Title	Applied Calculus
TOP Code/SAM Code	1701.00 - Mathematics, General / E - Non-Occupational
Rationale for adding this course to the curriculum	Content changes are to better align with CID guidelines for Business Calculus. Our local course content is being reduced to make the course more manageable and practical for the units and time frame. In addition, we are removing the 100% distance education option. The math department does not believe it to be effective to teach this course in an entirely online format.
Units	5
Cross List	*N/A*
Typical Course Weeks	18
Total Instructional Hours	

Contact Hours

Lecture	90.00
Lab	0.00
Activity	0.00
Work Experience	0.00
Outside of Class Hours	180.00

Total Contact Hours	90
Total Student Hours	270
Open Entry/Open Exit	No

Maximum Enrollment

Grading Option Letter Grade Only

Distance Education Mode of Instruction On-Campus Hybrid

SECTION B

General Education Information:

SECTION C

Course Description

  Repeatability May be repeated 0 times

  Catalog Description Presents a study of the techniques of calculus with emphasis on applications to business, life sciences and social sciences. Topics include modeling, applications of derivatives and integrals for polynomial, rational, exponential and logarithmic functions. Graphing calculator is required.

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SECTION D

Condition on Enrollment

1a. Prerequisite(s)

- MATH 106 or equivalent.

1b. Corequisite(s): *None*

1c. Recommended: *None*

1d. Limitation on Enrollment: *None*

SECTION E

Course Outline Information

1. Student Learning Outcomes:

  A. Solve applications by differentiation.
  B. Solve applications by integration.

2. Course Objectives: Upon completion of this course, the student will be able to:

  A. Find the derivatives of polynomial, rational, exponential, and logarithmic functions;
  B. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule;
  C. Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing and decreasing, maximum and minimum values, intervals of concavity and points of inflection;
  D. Analyze the marginal cost, profit and revenue when given the appropriate function;
  E. Analyze growth rate and doubling time for exponential growth functions and decay rate and half-life for exponential decay functions.
  F. Determine maxima and minima in optimization problems using the derivative;
  G. Use derivatives to find rates of change and tangent lines;
  H. Use calculus to analyze revenue, cost, and profit;

I. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques;
J. Use integration in business, economics, and life-science applications;
K. Evaluate improper integrals;
L.

3. Course Content

1) Functions and their graphs, including exponential and logarithmic functions;
2) Limits and intuitive limit definition of derivative;
3) Increments, tangent lines, and rate of change;
4) Rules of differentiation including sum, product, quotient, and the chain rule;
5) Implicit differentiation;
6) Applications of differentiation such as marginal analysis, growth and decay models, optimization, and curve sketching;
7) Antiderivatives, indefinite and definite integrals;
8) Multiple techniques of integration including substitution;
9) Area between curves;
10) Approximating definite integral as a sum; and
11) Applications of integration in business, economics, and life-sciences;
12) Improper integrals with applications;

4. Methods of Instruction:
   Activity:
   Discussion:
   Distance Education:
   Lecture:
   Projects:

5. Methods of Evaluation: Describe the general types of evaluations for this course and provide at least two, specific examples.
Typical classroom assessment techniques
   Exams/Tests --
   Quizzes --
   Oral Presentation --
   Projects --
   Group Projects --
   Home Work --
   Final Exam --
   Mid Term --
Additional assessment information:
   The Mathematics Department maintains a commitment to diverse teaching methods in courses emphasizing vital quantitative skills and qualitative reasoning ability (PEP Program Mission Statement, 2011). To that end, it is expected that sufficient formative assessments will be given to students that in frequency, length and rigor adequately assess both quantitative skills and qualitative reasoning.

   Sample assessment questions follow.
   1. The concentration of a certain drug in the bloodstream t minutes after swallowing a pill containing the drug can be approximated using the equation $C(t) = 1/4(2t+1)^{-1/2}$, where $C(t)$ is the concentration in arbitrary units and t is in minutes. Find the rate of change of concentration in the bloodstream with respect to time at t = 4 minutes.

2. What interest rate would be required to grow a deposit of $45,000 to $73,454 in 10 years with continuous compounding?

Letter Grade Only

6. Assignments: State the general types of assignments for this course under the following categories and provide at least two specific examples for each section.

    A. Reading Assignments
       Read sections from the textbook, for example:
       1. Read the section on The Chain Rule
       2. Read the section on growth models
    B. Writing Assignments
       Students will solve text problems regarding applications of integrals and derivatives.
       1. Complete exercises 1 - 30 odd from section 1.7 on using The Chain Rule
       2. Complete exercises 1 - 15 odd from section 3.3 on uninhibited and limited growth models
    C. Other Assignments
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7. Required Materials

    A. EXAMPLES of typical college-level textbooks (for degree-applicable courses) or other print materials.

    Book #1:

Author:	Bittinger, M., Ellenbogen, D.
Title:	Calculus and its Applications
Publisher:	Pearson/Addison Wesley
Date of Publication:	2012
Edition:	10th

    Book #2:

Author:	Stewart, J., Clegg, D.
Title:	Brief Applied Calculus
Publisher:	Brooks/Cole
Date of Publication:	2012
Edition:	1st

    B. Other required materials/supplies.

- Graphing calculator is required.