COLLEGE OF THE DESERT

Course Code MATH-001B

Course Outline of Record

1. Course Code: MATH-001B
2. a. Long Course Title: Calculus
   b. Short Course Title: CALCULUS
3. a. Catalog Course Description:
   This course is a study of the meaning, methods and applications of integration and infinite series. Topics include the definition of the definite integral, the Fundamental Theorem of Calculus, techniques of integration, applications of integration, first order separable differential equations, modeling exponential growth and decay, infinite series and approximation of functions using Taylor series with remainder.
   b. Class Schedule Course Description:
   This is the second semester of Calculus. It covers methods and applications of integration and infinite series.
   c. Semester Cycle (*if applicable*): N/A
   d. Name of Approved Program(s):
   - CHEMISTRY Associate in Science for Transfer Degree (AS-T)
   - CHEMISTRY AS Degree and Transfer Preparation
   - BIOLOGY Associate in Science for Transfer Degree (AS-T)
   - ENVIRONMENTAL SCIENCES AS Degree and Transfer Preparation
   - GEOLOGY Associate in Science for Transfer Degree (AS-T)
   - MATHEMATICS AS Degree and Transfer Preparation
   - MATHEMATICS Associate in Science for Transfer Degree (AS-T)
   - PHYSICS Associate in Science for Transfer Degree (AS-T)
4. Total Units: 4.00 Total Semester Hrs: 108.00
   Lecture Units: 3 Semester Lecture Hrs: 54.00
   Lab Units: 1 Semester Lab Hrs: 54.00
   Class Size Maximum: 35 Allow Audit: No
   Repeatability No Repeats Allowed
   Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
   Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)
   Prerequisite: MATH 001A
6. Textbooks, Required Reading or Software: *(List in APA or MLA format.)*
   a. James Stewart (2012). *Calculus, Early Transcendentals* (7th/e). Brooks Cole.
   College Level: Yes
   Flesch-Kincaid reading level: 12.2
7. Entrance Skills: *Before entering the course students must be able:*

   a.
   Compute the limit of a function at a real number.

   - MATH 001A - Compute the limit of a function at a real number;

   b.
   Determine if a function is continuous at a real number.

   - MATH 001A - Determine if a function is continuous at a real number;

   c.
   Find the derivative of a function as a limit.

- MATH 001A - Construct the derivative of a function as a limit;

d.
Find the equation of a tangent line to a function.

- MATH 001A - Construct the equation of a tangent line to a function;

e.
Compute derivatives using differentiation formulas.

- MATH 001A - Compute derivatives using differentiation formulas;

f.
Use differentiation to solve applications such as related rate problems and optimization problems.

- MATH 001A - Use differentiation to solve applications such as related rate problems and optimization problems;

g.
Use implicit differentiation.

- MATH 001A - Use implicit differentiation;

h.
Graph functions using methods of calculus.

- MATH 001A - Graph functions using methods of calculus;

i.
Evaluate a definite integral as a limit.

- MATH 001A - Evaluate a definite integral as a limit;

j.
Evaluate integrals using the Fundamental Theorem of Calculus.

- MATH 001A - Evaluate integrals using the Fundamental Theorem of Calculus; and

k.
Apply integration to find area.

- MATH 001A - Apply integration to find area.

8. Course Content and Scope:

Lecture:

1. Review of definite integrals and Riemann sums;
2. Review of porperties of the integral;
3. Review of the Fundamental Theorem of Calculus;
4. Review of integration by substitution;
5. Areas between curves;
6. Volume, volume of a solid of revolution;
7. Additional techniques of integration including integration by parts and trigonometric substitution;
8. Numerical integration; trapezoidal and Simpson's rule;
9. Improper integrals;
10. Applications of integration to areas and volumes;
11. Additional applications such as work, arc length, area of a surface of revolution, moments and centers of mass, separable differential equations, growth and decay;
12. Introduction to sequences and series;
13. Multiple tests for convergence of sequences and series;
14. Power series, radius of convergence, interval of convergence;
15. Differentiation and integration of power series;

16. Taylor series expansion of functions;
17. Parametric equations and calculus with parametric curves; and
18. Polar curves and calculus in polar coordinates;

Lab: *(if the "Lab Hours" is greater than zero this is required)*

1. Applications of topics discussed in lecture using appropriate mathematical tools, including technology.

9. Course Student Learning Outcomes:
   1. Define the concept of definite and indefinite integral of a function.
   2. Use a variety of methods of finding indefinite integrals of functions, and use finite and infinite sums of expressions to approximate functions and define new functions.
   3. Model and solve application problems that involve infinite sums, e.g. the computation of lengths, areas volumes, masses, profits and probabilities.
   4. Demonstrate critical and logical thinking in the context of integral calculus.

10. Course Objectives: *Upon completion of this course, students will be able to:*
    a. Evaluate definite and indefinite integrals using a variety of integration formulas and techniques;
    b. Apply integration to areas and volumes, and other applications such as work or length of a curve;
    c. Evaluate improper integrals;
    d. Apply convergence tests to sequences and series;
    e. Represent functions as power series; and
    f. Graph, differentiate and integrate functions in polar and parametric form.

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*
    a. Discussion
    b. Laboratory
    c. Lecture
    d. Participation
    e. Technology-based instruction

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*
    In Class Hours: 108.00
    Outside Class Hours: 108.00
    a. In-class Assignments
       1. Attend classroom lectures and take notes.
       2. Participate in classroom discussions to review, analyze, diagnose, and evaluate various methods of solution used in homework assignments.
       3. Complete laboratory assignments using appropriate mathematical tools.
       4. Complete examinations involving problems that apply studied principles to new situations.
    b. Out-of-class Assignments
       1. Read textbooks and supplementary assignments.
       2. Complete assigned homework including problem solving, exercises to improve skills and mathematical understanding.
       3. Complete examinations involving problems that apply studied principles to new situations.

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*
    - College level or pre-collegiate essays

- Written homework
- Guided/unguided journals
- Portfolios
- Term or research papers
- Reading reports
- Laboratory projects
- Computational/problem solving evaluations
- Presentations/student demonstration observations
- Group activity participation/observation
- Product/project development evaluation
- Self/peer assessment and portfolio evaluation
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution
- Oral and practical examination
- Other

14. Methods of Evaluating: Additional Assessment Information:

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*
IGETC Area 2: Mathematical Concepts and Quantitative Reasoning
A: Mathematic
CSU GE Area B: Physical and its Life Forms(mark all that apply)
B3 - Laboratory Sciences
PO-GE C4.b - Language & Rationality (Communication & Analytical Thinking)
Gather, assess, and interpret relevant information.
Apply logical and critical thinking to solve problems; explain conclusions; and evaluate, support, or critique the thinking of others.
IO - Scientific Inquiry
Analyze quantitative and qualitative information to make decisions, judgments, and pose questions.
IO - Global Citizenship - Scientific & Technological Literacy
Utilize quantitative expression in a variety of contexts. These would include units of measurement, visual representations, and scales and distributions.
Synthesize, interpret, and infer, utilizing information, data, and experience to solve problems, innovate, and explore solutions.

16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year

17. Special Materials and/or Equipment Required of Students:
Graphing and programmable calculator

18. Materials Fees: ☐ Required Material?

Material or Item	Cost Per Unit	Total Cost

19. Provide Reasons for the Substantial Modifications or New Course:

SLO Update

20. a. Cross-Listed Course *(Enter Course Code)*: *N/A*
b. Replacement Course *(Enter original Course Code)*: *N/A*

21. Grading Method *(choose one)*: Letter Grade Only

22. MIS Course Data Elements
    a. Course Control Number [CB00]: CCC000568550
    b. T.O.P. Code [CB03]: 170100.00 - Mathematics, General
    c. Credit Status [CB04]: C - Credit - Not Degree Applicable
    d. Course Transfer Status [CB05]: A = Transfer to UC, CSU
    e. Basic Skills Status [CB08]: 2N = Not basic skills course
    f. Vocational Status [CB09]: Not Occupational
    g. Course Classification [CB11]: Y - Credit Course
    h. Special Class Status [CB13]: N - Not Special
    i. Course CAN Code [CB14]: *N/A*
    j. Course Prior to College Level [CB21]: Y = Not Applicable
    k. Course Noncredit Category [CB22]: Y - Not Applicable
    l. Funding Agency Category [CB23]: Y = Not Applicable
    m. Program Status [CB24]: 1 = Program Applicable

    Name of Approved Program *(if program-applicable)*: BIOLOGY,CHEMISTRY,CHEMISTRY,ENVIRONMENTAL SCIENCES,GEOLOGY,MATHEMATICS,MATHEMATICS,PHYSICS

    Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment
    First Year: 0
    Third Year: 0

24. Resources - Faculty - Discipline and Other Qualifications:
    a. Sufficient Faculty Resources: Yes
    b. If No, list number of FTE needed to offer this course: *N/A*

25. Additional Equipment and/or Supplies Needed and Source of Funding.

    N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. *(Explain:)*

    N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES
    Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Dustin S. Culhan Origination Date 10/15/17