MATH 0031 - ANALYTICAL GEOMETRY AND CALCULUS II

SECTION A

1. Division: Sciences & Mathematics
2. Subject Code: MATH
3. Course Number: 0031
4. Course Title: ANALYTICAL GEOMETRY AND CALCULUS II
5. Semester of First Offering: SPRING 2015

SECTION B General Course Information

1.Units: 4.0 **Variable Units:** N/A
2.This Course is: Degree-Applicable Credit - Transferable
3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		**5. Standard Term Total Semester Hours**	
Lecture/Discussion:	4	Lecture/Discussion:	72
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	4	**Total Hours :**	72

6. Minimum hours per week of independent work done outside the class: 8

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is REQUIRED to be completed previous to enrollment in this course.)

Completion of MATH 30 with grade of "C" or better

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does not refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated only if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

- ☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.
- ☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.
- ☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Continuation of MATH 30. Content includes techniques of integration, improper integrals, applications of integration, infinite series, parametric equations and polar coordinates.

Course Outline Information

10. Student Performance Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

1. Calculate anti-derivatives of algebraic, trigonometric, inverse and transcendental functions using appropriate integration techniques;
2. apply the techniques of integration to reduce an integral to one listed in integral tables and then use the tables to find anti-derivatives;
3. use integration, differentiation, and inverse functions to solve applied problems;
4. solve integration and differentiation problems using parametric equations and/or polar coordinates;
5. demonstrate knowledge and theory of infinite series by applying appropriate theorems to determine convergence and divergence; and
6. use infinite series to solve appropriate problems in mathematics and the sciences.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

I. Integrals
A. Review of the Definite Integral as the Limit of a Riemann Sum
B. The Fundamental Theorem of Calculus
C. Net Change Theorem
D. Substitutions in the Definite Integral
E. Numerical Integration
II. Techniques of Integration
A. Basic Substitutions
B. Integration by Parts
C. Trigonometric Integrals
D. Trigonometric Substitutions
E. Integration of Rational Functions by Partial Fractions
F. Rationalizing Substitutions
G. Strategy for Integrations
H. Using Tables of Integrals and Computer Algebra Systems
I. Numerical Integration
J. Improper Integrals
III. Applications of Integration
A. Area between curves
B. Volumes
C. Differential Equations
D. Arc Length
E. Area of a Surface of Revolution
F. Moments and Centers of Mass
G. Work
H. Average Value of a Function
I. Hydrostatic Pressure and Force
IV. Parametric Equations and Polar Coordinates
A. Curves Defined by Parametric Equations
B. Tangents and Area
C. Arc Length and Surface Area
D. Polar Coordinates
E. Areas and Lengths in Polar Coordinates
F. Conic Sections
G. Conic Sections in Polar Coordinates
V. Infinite Sequences and Series
A. Sequences
B. Series
C. Integral Test and Estimation of Sums
D. Comparison Tests
E. Alternating Series
F. Absolute Convergence and the Ratio and Root Tests
G. Strategy for Testing Series
H. Power Series
I. Representation of Functions as Power Series
J. Taylor and Maclaurin Series
K. Binomial Series
L. Application of Taylor Polynomials

12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)
Example 1: Read in your textbook about 2 methods for calculating the volume of a solid of revolution.

Example 2: Research online the history of Newton's discovery of the Binomial Series.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

1. Students will write a 3 - 5 paragraph report on Newton's discovery of the binomial series.
2. Calculate areas bounded by polar graphs. Example: Find the area enclosed inside the cardiod r = 5cos(t) and outside the rose r = 2sin(3t).

c. Other (Term projects, research papers, porfolios, etc.)

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

- ☑ Yes
- ☐ No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

Book 1:

Author:	William Briggs and Lyle Cochran
Title:	Calculus: Early Transcendentals
Publisher:	Addison-Wesley
Date of Publication:	2014
Edition:	2nd

c. Other materials and/or supplies required of students:

14.Check all Instructional methods used to present course content:

- ☑ Lecture
- ☑ Discussion Semminar
- ☐ Lab
- ☑ Directed Study
- ☐ Activity
- ☐ Distance Education (requires supplemental form)
- ☐ Work Experience
- ☐ Tutoring

Other:

Give detailed examples of teaching methodology that relate to the course performance objectives:

Example 1- Interactive lecture format to develop the concept of finding a power series representation of a variety of functions. For each type of function, the instructor will incorporate algebraic derivation and visual analysis through graphing. Students will participate verbally and will work several examples.

Example 2: In class, small group collaborative learning activities will focus on determining which methods of integration to use for a variety of problems. Students will practice recognizing which method to try, testing their conjectures, and developing solutions with peers.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

- ☐ Essay Exam
- ☐ Objective Exam
- ☑ Projects
- ☑ Class Discussion
- ☐ Reports
- ☑ Problem Solving Exam
- ☐ Skill Demonstration
- ☐ Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

1. Find the volume generated when the region bounded by the curves y = cos x and y = (cos x)^2 for values of x between x = 0 and x = pi, is revolved about the y axis. This problem is graded for correct method and accuracy.

2. Use Taylor's Inequality to determine the number of terms of the Maclaurin series for e^x that should be used to estimate e^0.1 to within 0.00001. This problem is graded for method and accuracy.

SECTION C

1. Program Information:

- ☑ In an approved program
- ☐ Part of a new program
- ☐ Not part of an approved program

2. TOP Code Information

Program Title: Mathematics, General 170100

3. Course SAM Code:

- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Minimum Qualifications/Degrees:

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:
Communication & Analytic Thinking
Math Competency

2. CSU GE Applicability:
B-4 Mathematics/Quantitative Reasoning

3. IGETC Applicability:
2: Mathematical Concepts & Quantitative Reasoning

4. CAN : MATH 220 Single Variable Calculus II Early Transcendentals; and, with MATH 30, MATH 900S Single Variable Calculus Sequence

5. LDTP:

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

- ☑ CSU Transferable
- ☑ UC Transferable
- ☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

American River College: MATH 401 Calculus II
CSU Sacramento: MATH 31 Calculus II
UC Davis: MATH 21B Calculus

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

Required for all math, physics, and engineering majors.

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationship

Transfer-level math class.

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

Meets GE applicability for Math Competency and Communication and Analytical Thinking. Course includes all four math program SLO's. (Equations and Expressions, Visual Models, Applied Problems, Communication)

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

All math faculty members meet the minimum qualifications to teach this course. No special training would be required.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

No additional resources are needed since we have the classroom space and technology already available.

SECTION G

1. Maximum Class Size (recommended): 35

2. If recommended class size is not standard, then provide rationale: