SJHS

New Course Proposal Submitted By: *

Seward

Course Title *

MSJC Math 212 Analytic Geometry and Calculus II

Transcript Title (15 characters or less) *

Please be sure to count each character and spaces used to be no more than 15.

MSJC MATH 212

Course Code (assigned by Data Management, extension 4221):

M1212

Academic Department *

Math

Graduation Requirement Met *

Math

Honors (*note: Honors courses seeking A - G status must offer a non-Honors equivalent course) *

No

Grade Level (check all that apply) *

- [ ] 6th
- [ ] 7th
- [ ] 8th
- [ ] 9th
- [ ] 10th
- [x] 11th
- [x] 12th

Pre-Requisite (list all that apply) *

Math 211

Co-Requisite (list all that apply) *

n/a

Possible credits *

10 - year long class

Course Learning Environment *

- [x] Classroom Based
- [ ] Online/Hybrid

CALPADS Course Code (assigned by Data Mgt.)

9273

Career Technical Education Courses

Will this course be part of CTE Pathways? *

No

Is this an Integrated Course (Academics with Career Technical Education) *

No

CTE Courses Only: Indicate the Level of the Course:

CTE Courses Only: Indicate the Industry Sector

CTE Courses Only: Career Pathway & Code Pathway Name

Submitting Courses That are Program Status, Courses Modeled After Another Institution, or Online, or AP

Course Plans for Program Status, Online, or AP must be attached to this form.

Will this course meet any of the descriptors above? *

Yes

Program Status Courses (can be auto approved) - Name the Exact Program and Course Title:

MSJC Math 212

Submitting a Course Modeled After Another Institution:

When modeling after another institution's course, you will also need to enter a course overview specific to San Jacinto Unified School District as well as course content specific to SJUSD.
Any course modeled after another institution's course will not more forward until it has been written to reflect SJUSD's unique needs.

Submitting a course modeled after another institution.

Which school and ATP code? Must state exact course title.

MSJC Math 212 Analytic Geometry and Calculus II

Adopt an Online Publisher Course

Adopt a Program Status Course

Advanced Placement (AP) Courses Only: Please answer the following questions:

This section only applies to AP courses.

AP Courses Only: Date Submitted to CollegeBoard for AP Audit:

Month ▼ Day ▼ 2020 ▼

Exact Course Title

CollegeBoard Authorization Code

Course Content

Please note: There are not specific requirements regarding the number of units each course should have.
For reference: University of California A-G Guide: http://www.ucop.edu/agguide/a-g-requirements/index.html
Copy and paste the link into your web browser for course samples.

Course Overview: Provide a brief summary (3 - 5 sentences) of the course's content. *

Math 212 develops our students' abilities to problem solve and model (GELO5) by developing facilities to solve problems in terms of differentiation and integration. Writing mathematical information symbolically, visually, and numerically (GELO4) are also developed in the contexts of differentiating, integrating, and sketch curve defined by parametric equations.

For EACH UNIT of the course, please provide:

1. A unit title
2. A concise 3 - 5 sentences describing the topics being addressed that demonstrate the critical thinking, depth, and progression of the content covered.
3. A brief 3 - 5 sentences summarizing a key assignment from this unit and covering:
a. how a student will complete this assignment
b. what a student will produce
c. what the student will learn
Most importantly, use the unit(s) and key assignment(s) to demonstrate that the course meets the subject specific course criteria on the A - G Guide.

Units (outline each unit in the section provided. Indicate new units with a number and title) *

A. Exponential and Logarithmic Functions
1. Derivatives and integrals of exponential and logarithmic functions; 2. Logarithmic differentiation; 3. Derivative of inverse ; 4. Indeterminate limit forms and L'Hopital's Rule.
B. Inverse Trigonometric Functions
1.Definitions and domains of the six inverse trigonometric functions; 2.

Expressions containing inverse trigonometric functions; 3. Derivatives of inverse trigonometric functions and integrals whose antiderivatives contain inverse trigonometric functions.
C. Techniques of Integration
1. Integration by parts; 2. Trigonometric integrals; 3. Integration by trigonometric substitutions; 4. Integration using partial fraction decomposition; 5. Numerical integration utilizing trapezoidal and Simpson's Rule. 4. Improper Integrals
D.
1.Improper integrals with infinite intervals; 2. Improper integrals with discontinuous integrands.
E. Applications of Integration
1. Arc length of a curve; 2. Area of a surface of revolution; 3. Work, Moments and center of mass.
F. An Introduction to First Order Differential Equations
1. Definition of a first order differential equation; 2. Method of Integrating Factors to solve an equation; 3. Method of Separation of Variables to solve an equation; 4. Exponential growth and decay models.
G. Infinite Sequences
1. Definition of an infinite sequence; 2. Convergence of a sequence; 3. Limit of a convergent sequence; 4. General term of a sequence; 5. Monotone and strictly monotone sequences.
H. Infinite Series
1. Definition of an infinite series; 2. The nth partial sum of an infinite series; 3. Sum of a telescoping series and sum of (convergent) geometric series; 4. Divergence, Integral, Comparison, Limit Comparison, Ratio and Root Tests; 5. Alternating series, test for (conditional or absolute) convergence; 6. The nth Taylor and Maclaurin polynomials; 7. Taylor and Maclaurin power series and their radius and interval of convergence; 8. Taylor Series expansion of functions; 9. Differentiation and integration of power series.
I. Parametric Equations
1. Parametric equations; 2. Orientation of a parametric curve; 3. Graphs of a parametric curve by plotting points; 4. Graphs of a parametric curve by eliminating the parameter; 5. Slopes, tangent lines and arc lengths; 6. Areas under a parametric curve.
J. Polar Coordinates
1. Points on the polar coordinate system; 2. Convertion from Cartesian to polar coordinates and vice versa; 3. Symmetries of polar curves; 4. Graphs of polar curves by plotting points in polar coordinates; 5. Graphs of polar curves using graphs in Cartesian coordinates; 6. Slopes, tangent lines and arc lengths; 7. Area of a region bounded by polar curves.

Course Materials

Provide the COURSE MATERIALS that students use and analyze throughout the course. When appropriate, please incorporate these materials into the course's unit descriptions in the COURSE CONTENT section. Some subject areas and disciplines require courses to include specific course materials. Please refer to the subject course criteria in the link above and/or the California Department of Education (http://www.cde.ca.gov/ci/cr/cf/imagen.asp) for more information.

Course Material

Please access the hyperlinked Google Slide deck for a sample of the required information for any course materials that will be used in the course.

Google Slide Deck Link w/samples

https://docs.google.com/a/sanjacinto.k12.ca.us/presentation/d/1LaBuMtWAqL9bMaPKGQ8ooRZ6AZOLtS2PV0HGPudpYqo/edit?usp=sharing

Select Course Material (select all that apply) *

- [x] Textbook
- [ ] Literary Text
- [ ] Manual
- [ ] Periodical
- [ ] Scholarly Article
- [x] Website
- [ ] Primary Document
- [ ] Multimedia
- [ ] Other

Course Material: Primary *

Stewart, J (2016). Calculus, 8th Edition Cengage. ISBN: 978-1-285-74062-1
Larson, R. Edwards,B.,H. (2018). Calculus, 11th Edition Cengage. ISBN: 978-1-337-27534-7

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Google Forms <forms-receipts-noreply@google.com>
To: sseward@sanjacinto.k12.ca.us

Thu, Jan 23, 2020 at 7:52 AM

Thanks for filling out San Jacinto Unified School District New Course Proposal

Here's what we got from you:

EDIT RESPONSE

Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: Marilena Beckstrand **Date:** 10/10/2019

Department	Subject	Course Number	Title
Mathematics	Mathematics MATH	212	Analytic Geometry and Calculus II

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units
4.00

Total Units
4.00

Lecture Contact Hours
64.00 - 72.00

Total Contact Hours
64.00 - 72.00

Lecture Homework Hours
128.00 - 144.00

Stand Alone:
Program Applicable

AA/AS Degree General Ed Breadth Area(s):
G MATH COMPETENCY

General Education Justification:

Math 212 develops our students' abilities to problem solve and model (GELO5) by developing facilities to solve problems in terms of differentiation and integration. Writing mathematical information symbolically, visually, and numerically (GELO4) are also developed in the contexts of differentiating, integrating, and sketch curve defined by parametric equations.

Maximum Enrollment:	30
Maximum Enrollment Justification:	**Course requires significant response to written materials - check all that apply:** *** Course requires an unusually large amount of written work to be responded to individually by the instructor per semester.** **Justification: Math 212 is the second and most challenging course in the Calculus sequence wherein all of a student"s prerequisite knowledge in conjunction with elementary analytic methods is deployed to solve both real-world and theoretical applications. These application problems are of sufficient depth and breadth to require pages of student work to develop a model and deduce the desired solution. The nuanced complexity inherent in these solutions require significant instructor time to evaluate, critique, and score significantly differentiating the present course from the ordinary workload per student associated with most mathematics courses. Hence, a maximum enrollment of thirty (30) students is sought to ensure a high-level of quality feedback to transfer students developing their mathematical modeling skills in support of their chosen majors.**
Grading Method:	**Letter Grade or P/NP**
TOP code:	**1701.00**

Can be Taken 1 **time(s) for credit** (max 4)

- [ ] - Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- [ ] - Intercollegiate athletics course
- [ ] - Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (**75 words** or less in gray box below).

This course is the second in the Calculus sequence. Students will differentiate exponential, logarithmic, and inverse trigonometric functions, perform logarithmic differentiation, and learn techniques of

integration. Evaluating improper integrals, indeterminate forms using L'Hopital's Rule, and infinite series are also included as well as polar coordinates, curves, parametric equations, and separable first-order differential equations.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (**25 words** or less in gray box below).

This course covers differentiation of transcendental functions, techniques of integration, improper integrals, indeterminate forms, infinite series, polar curves, parametric equations, and introductory differential equations.

Need for the course:

Math 212 is a university transferable course that meets the IGETC (GE:2A) and UC/CSU (GE:B4) requirement for mathematical concepts and quantitative reasoning and serves as the second semester Calculus course. It is also a required course for: the Chemistry, Mathematics, Physics, and Computer Science AS-T degrees, the Economics AA-T degrees,and the Liberal Arts: Math and Science AA degree and meets the G area for the associates degree.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

- MATH 211 with a Grade of C or better.

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.
-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.
-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)
Upon the completion of the course the student will be able to do the following:

1. Differentiate exponential, logarithmic, and inverse trigonometric functions.
2. Apply logarithmic differentiation.
3. Evaluate trigonometric integrals and apply integration methods, including integration by parts, trigonometric substitution, and partial fractions, for both definite and indefinite integrals.
4. Use integration to solve applications such as work and length of a curve.
5. Evaluate improper integrals.
6. Recognize indeterminate forms and apply L'Hopital's Rule.
7. Apply convergence tests for infinite sequences and series, and express a function as a Taylor Series.

8. Graph, differentiate and integrate functions in parametric form.
9. Graph, differentiate and integrate functions in polar form.
10. Solve simple separable first order differential equations.

Course Content:

(please number the outline of main topics and subtopics)

1. Exponential and Logarithmic Functions
    1. Derivatives and integrals of exponential and logarithmic functions;
    2. Logarithmic differentiation;
    3. Derivative of inverse ;
    4. Indeterminate limit forms and L'Hopital's Rule.
2. Inverse Trigonometric Functions
    1. Definitions and domains of the six inverse trigonometric functions;
    2. Expressions containing inverse trigonometric functions;
    3. Derivatives of inverse trigonometric functions and integrals whose antiderivatives contain inverse trigonometric functions.
3. Techniques of Integration
    1. Integration by parts;
    2. Trigonometric integrals;
    3. Integration by trigonometric substitutions;
    4. Integration using partial fraction decomposition;
    5. Numerical integration utilizing trapezoidal and Simpson's Rule.
4. Improper Integrals
    1. Improper integrals with infinite intervals;
    2. Improper integrals with discontinuous integrands.
5. Applications of Integration
    1. Arc length of a curve;
    2. Area of a surface of revolution;
    3. Work, Moments and center of mass.
6. An Introduction to First Order Differential Equations
    1. Definition of a first order differential equation;
    2. Method of Integrating Factors to solve an equation;
    3. Method of Separation of Variables to solve an equation;
    4. Exponential growth and decay models.
7. Infinite Sequences
    1. Definition of an infinite sequence;
    2. Convergence of a sequence;
    3. Limit of a convergent sequence;
    4. General term of a sequence;
    5. Monotone and strictly monotone sequences.
8. Infinite Series
    1. Definition of an infinite series;
    2. The nth partial sum of an infinite series;
    3. Sum of a telescoping series and sum of (convergent) geometric series;
    4. Divergence, Integral, Comparison, Limit Comparison, Ratio and Root Tests;

5. Alternating series, test for (conditional or absolute) convergence;
6. The nth Taylor and Maclaurin polynomials;
7. Taylor and Maclaurin power series and their radius and interval of convergence;
8. Taylor Series expansion of functions;
9. Differentiation and integration of power series.

9. Parametric Equations
    1. Parametric equations;
    2. Orientation of a parametric curve;
    3. Graphs of a parametric curve by plotting points;
    4. Graphs of a parametric curve by eliminating the parameter;
    5. Slopes, tangent lines and arc lengths;
    6. Areas under a parametric curve.
10. Polar Coordinates
    1. Points on the polar coordinate system;
    2. Convertion from Cartesian to polar coordinates and vice versa;
    3. Symmetries of polar curves;
    4. Graphs of polar curves by plotting points in polar coordinates;
    5. Graphs of polar curves using graphs in Cartesian coordinates;
    6. Slopes, tangent lines and arc lengths;
    7. Area of a region bounded by polar curves.

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
  Integration: Presentation of terminology, definitions, and theorems supporting discussion of example problems, such as differentiating exponential, logarithmic, and inverse trigonometric functions.
- **Method:** Discussion
  Integration: Discussion will be used to reinforce student comprehension of lecture topics, such as how to express a function as a Taylor Series.
- **Method:** Group activities, computer assisted instruction, and multimedia vehicles
  Integration: These methods may be employed, as appropriate, to assist students with developing intuition and depth of understanding of concepts, such as differentiating, integrating, and sketching polar curves.
- **Method:** Modeling
  Integration: The instructor will model accurate applications of Calculus techniques, such as applying logarithmic differentiation.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Homework
  Integration: Problems will be assigned allowing students, at their own pace, to develop skills

necessary for success in Calculus, such as evaluating improper integrals using definition and the appropriate techniques of integration. Homework will be evaluated on accuracy and completeness.

- **Method:** Exams/Tests
  Integration: Interim exams and a comprehensive final exams may be used to determine if a student successfully acquired skills, such as solving simple separable first order differential equations. Exams will be graded on accuracy, completeness, mathematical correctness, and demonstration of understanding through work done to solve the problems posed.
- **Method:** Quizzes
  Integration: Periodic quizzes may be used to assess the students' skill development throughout the course, such as recognizing indeterminate forms and applying L'Hopital's Rule. Quizzes will be evaluated on accuracy, completeness, and correctness.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. Find the limit of an indeterminate form.
2. Evaluate an integral using integration by parts.
3. Determine whether a series converges or diverges.
4. Find the radius of convergence and the interval of convergence of a power series.
5. Find the exact area of a surface of revolution described.

Textbooks:

- Stewart, J (2016). *Calculus, 8th Edition* Cengage. ISBN: 978-1-285-74062-1
- Larson, R. Edwards,B.,H. (2018). *Calculus, 11th Edition* Cengage. ISBN: 978-1-337-27534-7

Other Resources:

Minimum Qualification

- Mathematics (Masters Required)

Concurrent

EDUCATING AND INSPIRING EXCELLENCE

SJUSD

SAN JACINTO UNIFIED SCHOOL DISTRICT

New Course Signature/Approval Page

I. Suggested Course Title: MSJC Math 212

II. Department(s): Math

III. School: SJHS

IV. School Committee Members:

a. Name: Erika Gardner Signature: Erika Gardner

b. Name: Justin Carmona Signature: JC

c. Name: S. Seward Signature: SS

d. Name: Lloyd Sheppard Signature: Lloyd Sheppard

e. Name: _____ Signature: _____

V. Committee Meeting Date(s): 11/5, 11/6, 11/14

VI. Department Chair Signature:

a. Name: K. Cochran Signature: _____ Date: 12/10/19

b. Name: _____ Signature: _____ Date: _____

VII. Principal Signature:

a. Name: Courtney Hall Signature: _____ Date: 12/10/19

VIII. Course Proposal Reviewed by Educational Services:

a. ~~Executive~~ Director, Educational Services: Janet Cavacevich

Signature: _____ Date: 12-19-19

b. Assistant Superintendent of Educational Services: _____

Signature: _____ Date: 1/10/2020

IX. Course Proposal Approved by the Board of Trustees:

a. SJUSD Board of Trustees President: _____

Signature: _____ Date: _____