GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: MATH 2C DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2021 CURRICULUM APPROVAL DATE: 12/8/2020

SHORT TITLE: DIFFERENTIAL EQUA

LONG TITLE: Differential Equations

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
3	18	Lecture:	3	54
		Lab:	0	0
		Other:	0	0
		Total:	3	54

COURSE DESCRIPTION:

An introductory course in differential equations that covers: first order differential equations including separable, linear, exact, homogeneous, bernoulli and Euler's Method; second order differential equations including homogeneous, nonhomogeneous, variation of parameters, method of undetermined coefficients and reduction of order; series solutions to differential equations; Laplace Transforms; linear systems; and if time, Fournier Analysis; and applications thereof. (C-ID: MATH 240) PREREQUISITE: Mathematics 1C with a grade of 'C' or better.

PREREQUISITES:

Completion of MATH 1C, as UG, with a grade of C or better.

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Formulate, analyze and solve first, second, and higher order differential equations.

2. Solve applied problems involving differential equations.

3. Use technology to find numerical approximations to solutions of differential equations and to analyze graphs of solutions of differential equations.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 12/8/2020

HOURS: 3

Content: Basic definitions: terminology and the origins of differential equations, Verifying the solution of a differential equation (DE), Existence and uniqueness of solutions

Student Performance Objectives: Students will identify the order of a differential equation, whether it is linear or not, and verify a solution to a differential equation. Students will apply existence-uniqueness theorem to determine if a differential equation has a unique solution.

HOURS: 3

Content: Separable first-order DEs, General vs. specific solutions, Family of curves

Student Performance Objectives: Students will find and analyze general and specific solutions to separable DEs and use technology to graph and analyze the family of solutions.

HOURS: 3

Content: Linear first-order DEs

Student Performance Objectives: Students will identify and solve linear DEs.

HOURS: 3

Content: Exact first-order DEs, Integrating factors

Student Performance Objectives: Students will identify and solve exact DEs and find integrating factors to make a differential equation exact.

HOURS: 3

Content: Bernoulli first-order DEs, Homogeneous first-order DEs

Student Performance Objectives: Students will identify and solve Bernoulli and homogeneous DEs.

HOURS: 3

Content: Euler's Method, Applications of first-order DEs

Student Performance Objectives: Students will use technology to find the numerical solution to an initial value problem using Euler's Method. Student will solve applications of first-order DEs such as population modeling, mixture problems, circuits, slope fields and other applied problems.

HOURS: 3

Content: DEs of higher order: fundamental sets, independent solutions, Wronskian, Reduction of Order

Student Performance Objectives: Students will use the Wronskian to determine if a set of solutions forms a fundamental set and construct the general solution. Students will use the method of Reduction of Order to solve a second-order DE.

HOURS: 3

Content: Homogeneous linear equations with constant coefficients: characteristic equations with real, repeated and complex roots

Student Performance Objectives: Students will find solutions to second-order homogeneous DEs where the characteristic equation has two distinct real roots, repeated roots and complex roots, and analyze the solution graphically. Student will also solve such problems when initial conditions are given and analyze the solution under various conditions.

HOURS: 6

Content: Change of variables, Solutions to nonhomogeneous DEs using the method of undetermined coefficients

Student Performance Objectives: Students will solve DEs using change of variable technique. Students will solve non-homogeneous DEs using the method of undetermined coefficients.

HOURS: 6

Content: Variation of Parameters, Applications of second-order DEs

Student Performance Objectives: Students will solve second-order nonhomogeneous equations using the method of variation of parameters. Students will solve applications of second-order DEs such as problems involving harmonic oscillators and circuits.

HOURS: 4

Content: Review of power series, Power series solutions

Student Performance Objectives: Students will find power series solutions to DEs about ordinary points.

HOURS: 6

Content: Laplace transforms: definitions, operational properties, inverse transforms, and applications to DEs

Student Performance Objectives: Students will calculate Laplace transforms using both the definition and operational properties approaches. Student will find the inverse of the Laplace transform of a given function and solve DEs using Laplace transforms.

HOURS: 3

Content: Systems of DEs including systems of linear first-order equations.

Student Performance Objectives: Students will solve a system of linear first-order DEs.

HOURS: 3

Content: Fourier series

Student Performance Objectives: Students will find Fourier series of step and piecewise functions and other discontinuous functions.

HOURS: 2

Final Exam

METHODS OF INSTRUCTION:

Instruction will follow a standard lecture/discussion format. Extensive homework will be assigned in order to assure mastery of the concepts covered in class. Students will also be required to utilize technology to enhance their understanding of the material. Students will be given opportunities to work together on problems given in class and group projects.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 108

Assignment Description:

1. Analyze and study pertinent text material, solved examples and lecture notes.
2. Apply principles and skills covered in class by solving regularly-assigned homework problems.
3. Regularly synthesize course materials in preparation for exams.
4. Projects to apply concepts learned in class

METHODS OF EVALUATION:
Writing assignments
Percent of total grade: 10.00 %
Out of class projects.
Problem-solving assignments
Percent of total grade: 10.00 %
Homework problems, quizzes.
Objective examinations
Percent of total grade: 80.00 %
In-class written exams.

REPRESENTATIVE TEXTBOOKS:
Dennis Zill. Differential Equations with Boundary Value Problems. Cengage,2017.
ISBN: ISBN-13: 978-1305965799, ISBN-10: 9781305965799
Reading Level of Text, Grade: 12 Verified by: Jennifer Nari

Recommended Representative Textbooks
Boyce, DiPrima, Meade. Elementary Differential Equations and Boundary Value Problems. Wiley,2017.
ISBN: ISBN-13: 978-1119443766, ISBN-10: 1119443768
Reading Level of Text, Grade: 12 Verified by: Jennifer Nari

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

GAV B4, effective 200530

CSU GE:

CSU B4, effective 200530

IGETC:

IGETC 2A, effective 200530

CSU TRANSFER:

Transferable CSU, effective 200530

UC TRANSFER:

Transferable UC, effective 200530

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: MATH24
CAN Sequence: XXXXXXXX
CSU Crosswalk Course Department: MATH
CSU Crosswalk Course Number: 240
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000215283
Sports/Physical Education Course: N
Taxonomy of Program: 170100