GAVILAN COLLEGE

5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: ENGR 5 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2020 CURRICULUM APPROVAL DATE: 03/12/2019

SHORT TITLE: ENGR PROG AND PROB SOLVING

LONG TITLE: Engineering Programming and Problem Solving

Units	Number of Weeks		Contact Hours/Week		Total Contact Hours
3	18	Lecture:	2	Lecture:	36
		Lab:	3	Lab:	54
		Other:	0	Other:	0
		Total:	5	Total:	90

COURSE DESCRIPTION:

This course utilizes the MATLAB (or equivalent) environment to provide students with a working knowledge of computer-based problem-solving methods relevant to science and engineering. It introduces the fundamentals of procedural and object-oriented programming, numerical analysis, and data structures. Topics will include basic control structures, data types, input/output, logical expressions, and the syntax and semantics of a modern programming language. Additional topics include matrix manipulation, curve plotting, finding solutions of differential equations (ODEs), and statistical analysis. Examples and assignments in the course are drawn from practical applications in engineering, physics, and mathematics.
PREREQUISITE: Mathematics 1A with a grade of 'C' or better. May be taken concurrently.

PREREQUISITES:
Completion of MATH 1A, as UG, with a grade of C or better., Concurrent OK

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
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity

04B - Laboratory - LEH 0.75

STUDENT LEARNING OUTCOMES:

1. Apply a top-down design methodology to develop computer algorithms.
Measure of assessment:Exam, homework, lab
Year assessed, or planned year of assessment:2019
Semester:Spring

2. Create, test and debug sequential Matlab programs, as well as programs that use object-oriented techniques, in order to achieve computational objectives.
Measure of assessment:Exam, homework, lab
Year assessed, or planned year of assessment:2020
Semester:Spring

3. Apply numeric techniques and computer simulations to analyze and solve engineering-related problems.
Measure of assessment:Exam, homework, lab
Year assessed, or planned year of assessment:2020
Semester:Spring

4. Use MATLAB effectively to analyze and visualize data.
Measure of assessment:Exam, homework, lab

5. Demonstrate understanding and use of standard data structures.

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

Curriculum Approval Date: 03/12/2012
58 Hours

TOPIC: Computer programming.
STUDENT PERFORMANCE OBJECTIVES:
1. Identify and apply the principles of computer programming to the solution of engineering problems.
2. Identify and apply variables, constants, expressions, operators, order of operations, and elementary functions.
3. Identify and apply array definitions and operations and multi-dimensional arrays.
4. Identify and apply repetitive statements, looping, and recursion.
5. Identify and apply formatted input and output, data files, pointers, and references.
6. Identify and apply strings and string manipulation.
7. Identify and apply object-oriented and procedural programming.

HOMEWORK: Reading and problems from the text, laboratory assignments.
20 Hours

TOPIC: Numerical computing.
STUDENT PERFORMANCE OBJECTIVES:
1. Identify and apply the principles of numerical computing using available software to the solution of engineering problems.
2. Identify and solve systems of linear equations.
3. Identify and solve ordinary differential equations.

4. Identify and apply numerical differentiation and integration techniques.
5. Identify and apply least-squares and linearization techniques.

HOMEWORK: Reading and problems from the text, laboratory assignments.
10 Hours

TOPIC: Analysis and presentation of data using spreadsheets.
STUDENT PERFORMANCE OBJECTIVES:
1. Identify and apply the principles of spreadsheet analysis tools to the solution and presentation of engineering problems.
2. Identify and apply statistical analysis functions on a set of data.
3. Identify and apply tools for graphing, finding equations of best fit, and comparing data sets.
HOMEWORK: Reading and problems from the text, laboratory assignments.
2 Hours
Final Exam

METHODS OF INSTRUCTION:
Instruction will follow a standard lecture/discussion format with an additional laboratory period. Homework will be assigned in order to assure mastery of the concepts covered in class. During the laboratory periods students will also be required to utilize computer with MATLAB/FreeMat programming software. FreeMat is a free environment for rapid engineering and scientific prototyping and data processing. It is similar to commercial systems such as MATLAB from Mathworks, and IDL from Research Systems, but is Open Source. Throughout the course, students will be given opportunities to work together on problems given in class and group projects.

OUT OF CLASS ASSIGNMENTS:
Assignment Description:
Analyze and study pertinent text material, solved examples and lecture notes. Apply principles and skills covered in class by solving regularly-assigned homework problems. Regularly synthesize course materials in preparation for exams. Some of the assignments will be in the form of take home projects were students will work in groups.

METHODS OF EVALUATION:
Objective examinations
Percent of total grade: 60.00 %
In class exams. Each exam will include a portion that is “hands on” (i.e., using MATLAB) and a portion that is “hands off” (i.e., handwritten responses on paper).
Problem-solving assignments
Percent of total grade: 20.00 %
Homework assignments and take home projects.
Writing assignments
Percent of total grade: 20.00 %

REPRESENTATIVE TEXTBOOKS:
Required Representative Textbooks and other Materials
Stormy Attaway. MATLAB: A Practical Introduction to Programming and Problem Solving. Elsevier ,2017.
ISBN: 978-0-12-804525-1
Reading Level of Text, Grade: 12 Verified by: Verified by:RWL using MS Word.

90ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
CSU GE:
IGETC:
CSU TRANSFER:
Transferable CSU, effective 200630
UC TRANSFER:
Transferable UC, effective 200630

SUPPLEMENTAL DATA:
Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN:
CAN Sequence:
CSU Crosswalk Course Department: ENGR
CSU Crosswalk Course Number: 220
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: CCC000334216
Sports/Physical Education Course: N
Taxonomy of Program: 090100