

# College of San Mateo

## Course Outline

- New Course  
 Update/No change  
 Course Revision (Minor)  
 Course Revision (Major)

Date: Nov. 29, 2007

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**Department:** ENGINEERING      **Number:** 215  
**Course Title:** Computational Methods for Engineers and Scientists      **Units:** 3  
**Hours/Week:** Lecture: 2      Lab: 3      **By Arrangement:** 1

**Length of Course**

- Semester-long  
 Short course (Number of weeks \_\_\_)  
 Open entry/Open exit

**Grading**

- Letter  
 Credit/No Credit  
 Grade Option (letter or Credit/No Credit)

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1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

Math 251 or Math 241

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation.)

Two lecture and three lab hours plus one hour by arrangement per week. Prerequisite: Math 241 or Math 251. Introduction to problem solving, programming, and computational methods using the MATLAB programming environment. Procedural programming, recursion, sorting, object-oriented representations, and data structures. Plotting and data visualization, introduction to statistical analysis of data, systems of linear equations, numerical methods. Applications in engineering, mathematics, and the sciences. A materials fee in the amount shown in the Schedule of Classes is payable upon registration. (AA, CSU/UC)

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation.)

Introduction to problem solving, programming, and computational methods using the MATLAB programming environment. Applications in engineering, mathematics, and the sciences. Plus one hour by arrangement per week. A materials fee is payable upon registration. Prerequisite: Math 241 or Math 251.

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

1. Use MATLAB as a computational tool to solve problems in engineering, mathematics, and the sciences.
2. Use MATLAB as a plotting and visualization tool.
3. Understand and explain basic concepts in procedural and object oriented programming.
4. Design, implement, and test computer programs.
5. Understand and begin to use standard data structures.
6. Working from a verbal or equation-based problem description, set up systems of simultaneous equations and use MATLAB to determine existence and uniqueness of solution and solve.
7. Working from a verbal or equation-based problem description, use appropriate numerical differentiation and integration techniques.

7. **Course Objectives** (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section).*

same as student learning outcomes

8. **Course Content** (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

Problem solving in Engineering and Science  
 Introduction to Computers and Programming  
 Getting started with Matlab  
 Array and Matrix Basics  
 Execution Control  
 Functions  
 File I/O  
 Recursion  
 Plotting and Visualization  
 Introduction to Statistics  
 Linear Algebraic Equations  
 Numerical Methods (curve fitting, root-finding, integration, differentiation)  
 Sorting  
 Cell Arrays and Structures  
 Object Oriented Programming  
 Introduction to Data Structures  
 Optional Additional Topics: image processing, sound processing,

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.) **If hours by arrangement are required by this course, indicate the additional instructional activity which will be provided during this time.**

Lectures to introduce new material and topics.  
 Instructor demonstration of software.  
 Textbook reading assignments to expand knowledge.  
 Individual lab and take-home problems to develop skills.  
 Group lab assignments (optional)  
 Individual or group term programming project to integrate knowledge.  
 Hour by arrangement is used to provide additional instructor-supervised lab and group work time.

10. **Representative Methods of Evaluation** (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

Individual problem-solving assignments.  
Individual programming assignments.  
Group assignments (optional).  
Individual or group project.  
Individual exams.

11. **Representative Text Materials** (With few exceptions, texts need to be current. Include publication dates.)

*Engineering Computation with MATLAB*, David M. Smith, Pearson Addison Wesley, 2008.  
*Introduction to MATLAB 7 for Engineers*, W.J. Palm, McGraw-Hill, 2005. .

Prepared by:

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Submission Date:

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