

**ENGR 6 Course Outline as of Spring 2012****CATALOG INFORMATION**

Dept and Nbr: ENGR 6 Title: MATLAB FOR ENGINEERS

Full Title: Programming in MATLAB for Engineers

Last Reviewed: 12/12/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Engineering problem solving using the MATLAB computer programming environment. Designed to meet computer programming requirements for engineering transfer students. Students outline, write, test, and debug computer programs to solve engineering problems and display results. Emphasis on proper documentation of computer code and reports.

**Prerequisites/Corequisites:**

Course Completion or Current Enrollment in MATH 1A or higher (V2)

**Recommended Preparation:**

Course Completion of PHYS 1

**Limits on Enrollment:****Schedule of Classes Information:**

Description: Engineering problem solving using the MATLAB computer programming environment. Designed to meet computer programming requirements for engineering transfer students. Students outline, write, test, and debug computer programs to solve engineering problems and display results. Emphasis on proper documentation of computer code and reports. (Grade or P/NP)

Prerequisites/Corequisites: Course Completion or Current Enrollment in MATH 1A or higher (V2)

Recommended: Course Completion of PHYS 1

Limits on Enrollment:

Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

### **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>			Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>			Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>			Effective:	Inactive:
<b>CSU Transfer:</b>	Transferable	Effective:	Fall 2000	Inactive:	
<b>UC Transfer:</b>	Transferable	Effective:	Fall 2000	Inactive:	

**CID:**

**Certificate/Major Applicable:**

Major Applicable Course

### **COURSE CONTENT**

#### **Outcomes and Objectives:**

1. Utilize a methodical approach to solve computational problems.
2. Design algorithms and flowcharts to facilitate programming and problem solution.
3. Create computer programs to analyze data and generate tables, charts, and graphs.
4. Solve engineering related computational problems by applying MATLAB engineering tools.
5. Produce project documents in a careful and complete manner in order to effectively communicate the results of the analysis.
6. Document computer programs in a careful and complete manner in order to facilitate editing by another programmer.
7. Develop solution algorithms in a project based environment with only partially defined project parameters.
8. Practice collaborative problem solving and project management skills.

#### **Topics and Scope:**

1. Engineering Problem Solving Methodology
  - a. Problem definition and specifications
  - b. Input and output information and variables
  - c. Working a special case by hand
  - d. Design and implementation of computer algorithm
  - e. Test of algorithm
2. Technical Computing Environment
  - a. MATLAB interactive workspace
  - b. MATLAB documentation, help, and resources

- c. Common mathematical functions
- d. Designing, editing, and executing scripts
- e. User defined functions
- 3. Array Mathematics
  - a. Arrays: scalars, vectors, and matrices
  - b. Scalar and array operations
  - c. Array functions
  - d. Solutions to linear systems
  - e. Weighted average problems
  - f. Other engineering computations using arrays
- 4. Mathematical Functions
  - a. Complex numbers
  - b. Random numbers
  - d. Functions of two variables
- 5. Selection Programming Structures
  - a. Relational and logical operators
  - b. If statements
  - c. Else & elseif clauses
  - d. Relational and logical functions
- 6. Repetition Programming Structures
  - a. For loops
  - b. While loops
  - c. Switch-case construction
- 7. Text Programming
  - a. Character strings
  - b. String conversions
  - c. String functions
  - d. Display formatting
- 8. Graphical display
  - a. Independent variable set-up in 1 and 2 dimensions
  - b. Two dimensional plotting
  - c. Three dimensional surface plots
  - d. Plot annotation expectations
  - e. Manual annotation options
  - f. Annotation functions
- 9. Advanced Mathematical Operations
  - a. Polynomial functions and operations
  - b. Symbolic math toolbox
  - c. Statistical analysis
  - d. Integration and differentiation
  - e. Simulation
  - f. Optimization
- 10. Object oriented programming
  - a. MATLAB's graphical user interface objects
  - b. Object generation and parameter modification
  - c. Graphical user interface activation

### **Assignment:**

- 1. Textbook reading to supplement and reinforce lecture material, about 15 pages per week.
- 2. In-class exercises and homework assignments using the MATLAB computing environment, such as: programs, tables, and graphs.

3. In-class exercises and homework assignments outside the MATLAB computing environment, such as: short answer exercises, flowcharts, work schedules, and program outlines.
4. Group project to generate a complex computer program.
5. Objective examinations including at least three exams and a final.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework Assignments, Group Project

Problem solving  
40 - 70%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice, completion, short answer and program code

Exams  
30 - 60%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

### Representative Textbooks and Materials:

W. Palm, Introduction to MATLAB for Engineers, 3rd Ed. McGraw-Hill, 2011