**SOUTHEAST COMMUNITY COLLEGE**
**DIVISION OF ARTS AND SCIENCES**
**Mathematics**
**Revision Date: 07-01-23**

## I. CATALOG DESCRIPTION

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|---|---|
| Course Number: | ENGR1020 |
| Course Title: | MATLAB Programming and Problem Solving |
| Prerequisite(s): | A grade of 'C' or higher in MATH1150 or higher or appropriate score on the math placement test. |
| Catalog Description: | This course introduces students to the engineering problem solving process in the context of high level structured computer programming. The course consists of a sequence of programming assignments that require students to write computer programs to solve engineering problems. All of the computer assignments will be written in MATLAB. |
| Credit Hours: | 3.0 |
| Class Hours: | 45 |
| Lab Hours: | 0 |
| Total Contact Hours: | 45 |

## II. COURSE OBJECTIVES: *Course will*:

**A**. Train students to apply problem solving skills to the computer solution of engineering problems.

**B**. Train students to be able to write, debug and demonstrate the accuracy of computer programs written in MATLAB.

**C**. Train students to be able to write structured programs, including the use of function calls and file input and output.

**D**. Train students to effectively utilize data structures such arrays and linked lists in computer programs.

## III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

**A.** Student Learning Outcomes**:** *Student will be able to:*

**1**. Learn necessary programming skills needed for Engineering majors.

**2**. Use the skills learned in the course to be solve practical engineering problems.

**B.** General Education Learning Outcomes

**1.** GELO #3: Critical Thinking & Problem Solving

Outcome: Collect, identify, interpret and analyze data.

Outcome: Synthesize information to arrive at reasoned solutions to problems.

Outcome: Evaluate the validity of arguments, alternatives, data, outcomes, and/or impacts of actions.

**2**. GELO #5: Analytical, Quantitative, and Scientific Reasoning

Outcome: Apply mathematical and scientific methods to solve problems from an array of contexts and everyday situations.

Outcome: Understand and create logical arguments supported by quantitative and scientific evidence and communicate those arguments in a variety of formats.

Outcome: Effectively develop strategies, algorithms, or experiments (or performing experiments) to better describe the systems or to solve the problems.

Outcome: Manipulate formulas, data sets, graphs, tables, etc. in a way to produce a meaningful outcome.

## IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

**A**. Introduction to computers and programming (chap 1)
**B**. Introduction to MATLAB variables, expressions, matrices (chap 1 and 2)
**C**. Overview of MATLAB programs, functions, and plotting (chap 3)
**D**. Selection, looping, and vectorizing code (chap 4, 5)
**E**. Programming with functions, recursion (chap 6, 10)
**F**. String manipulation (chap 7 – partial coverage)
**G**. Data structures: cell arrays and structures (chap 8)
**H**. Advanced file input and output (chap 9)
**I**. Sets, sorting, searching, indexes (chap 12)
**J**. Handle graphics, creating Graphical User Interfaces (chap 11.5, 13)

## V. INSTRUCTIONAL MATERIALS

**A**. Required Text(s):
**1**. Attaway, Stormy, *MATLAB: A Practical Introduction to Programming and Problem Solving*, 4th ed., Elsevier, 2016. ISBN: 978-1118807330.

## VI. METHODS OF PRESENTATION/INSTRUCTION

**A.** Methods of presentation typically include a combination of the following:
**1**. Lecture
**2**. Small group discussions
**3**. Lab activities using MATLAB

## VII. METHODS OF EVALUATION

**A**. Labs (top 10): 50%
**B**. Tests (three): 45%
**C**. Attendance/Participation: 5%
**D.** SCC GRADING SCALE

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|---|---|---|---|---|---|
| A+ | 95-100 | C+ | 75-79 | F | 59 or less |
| A | 90-94 | C | 70-74 | | |
| B+ | 85-89 | D+ | 65-69 | | |
| B | 80-84 | D | 60-64 | | |

## VIII. SPECIFIC COURSE REQUIREMENTS

**A**. None.