

**NIAGARA COUNTY COMMUNITY COLLEGE  
MASTER SYLLABUS**

**ENS/CPS 110 Computer Programming for Engineers**

I. Basic Course Information

A. Date	Approved: October 2015 Revised: February 2016
B. Division	Arts, Media & Technology Division/ Science, Health and Mathematics Division
C. Course Prefix, Number, and Title	ENS/ CPS 110 Computer Programming for Engineers
D. Credit Hours	4 Credit Hours
E. Weekly Contact Hours (lecture/lab)	4 Lecture Hours
F. Pre-requisites	Pre-requisites: None  Co-requisites: None  Pre-requisites that may be met concurrently: MAT116 – Pre-calculus Mathematics
G. Textbook	To be selected by instructor
H. Meets the following Elective Category(ies)	Computer Elective
I. Meets SUNY GER knowledge and skill area(s)	None

II. Course Description

This is a first course in computer programming that develops programming concepts using MATLAB with application to engineering problems. Topics include arithmetic expressions, input, output, plotting, branching and loop structures, debugging, and user-defined functions. These concepts will be illustrated and emphasized through engineering applications.

### III. Course Organization/Methods of Evaluation

#### Course Organization

A four hour per week lecture format will be used. Some lecture periods will include the instructor demonstrating computer methodology followed up with students working on the same or similar projects.

#### Methods of Evaluation

The instructor is encouraged to employ, but is not restricted to class participation, examinations, quizzes, problem sets, reports, computer projects or other evaluative criteria. Evaluation will be accomplished within the framework of College policies. (Consult the College Catalog and Faculty Handbook for further details.)

### IV. Student Learning Outcomes

At the completion of this course the student will:

- a. Design and implement algorithms to solve engineering problems.
- b. Understand the fundamental constructs used in programming including variables, data types, input, output, decisions, loops, and functions.
- c. Develop, write, test and debug computer programs in an object oriented programming language to solve engineering problems.
- d. Develop, write, test and debug computer programs in MATLAB to solve engineering problems.

### IV. Course Outline

1. Introduction to Programming
  - a. Defining the problem
  - b. Designing a solution to the problem
  - c. Coding an algorithm
  - d. Maintaining and documenting a program
2. Introduction to Programming Language
  - a. Data types
  - b. Variables
  - c. Input and output
  - d. Assignment statements
  - e. Comments
  - f. Debugging
3. Control Structures
  - a. If statements
  - b. Switch statements
  - c. Loops

4. Functions
  - a. Creating functions
  - b. Library functions
  - c. Parameters (value and reference)
  
5. MATLAB Environment
  - a. Windows
  - b. Variables
  - c. Arithmetic operations
  - d. Matrix and vector operations
  - e. Predefined MATLAB functions
  - f. Plotting
  - g. Graphs and charts
  
6. MATLAB Programming
  - a. Input / Output
  - b. Debugging
  - c. Functions
  - d. Using files
  - e. Control Structures

VI. References (or Bibliography)

Attaway, Stormy. MATLAB A Practical Introduction to Programming and Problem Solving. Waltham, MA: Butterworth-Heinemann, 2013.

Barnes, David and Michael Kolling. Objects First with Java (5<sup>th</sup> edition). Boston, MA: Pearson, 2012.

Beer, Ferdinand P., E. Russell Johnston, Jr. and David F. Mazurek. Vector Mechanics for Engineers: Statics/Dynamics (11<sup>th</sup> edition). New York, NY: McGraw-Hill Education, 2016.

Bowman, Stephan, William J. Park, Benjamin L. Still and Matthew W. Ohland. Thinking Like an Engineer. Upper Saddle River, NJ: Prentice Hall, 2014.

Cengel, Yunus A. and Michael A. Boles. Thermodynamics: An Engineering Approach (8<sup>th</sup> edition). New York, NY: McGraw Hill Education, 2015.

Chapman, Stephen J. Essentials of MATLAB Programming (2<sup>nd</sup> edition). Stamford, CT. Cengage Learning, 2009.

Gaddis, Tony. Starting Out with C++ from Control Structures through Objects (8<sup>th</sup> edition). New York, NY: Pearson Education, 2015.

---. Starting out with Java Early Objects (5<sup>th</sup> edition). Boston, MA: Pearson, 2015.

Gaddis, Tony, Judy Walters and Godfrey Muganda. Starting Out with C++ Early Objects (8<sup>th</sup> edition). New York: Pearson Education, 2013.

Gilat, Amos. MATLAB An Introduction with Applications. Hoboken, NJ: Wiley Publishing, 2014.

Lewis, John and William Loftus. Java Software Solutions (8<sup>th</sup> edition). Boston, MA: Pearson, 2015.

Malik, D. S. C++ Programming: From Problem Analysis to Program Design (7th edition). Boston, MA: Cengage, 2014.

---. C++ Programming: Program Design Including Data Structures (6th edition). Boston, MA: Cengage, 2012.

Prata Stephen. C++ Primer Plus (6<sup>th</sup> edition). New York, NY: Pearson Education, 2012.

Savitch, Walter. Problem Solving with C++ (9<sup>th</sup> edition). Boston, MA: Addison Wesley, 2014.

Smith, David M. Engineering Computation with MATLAB. Upper Saddle River, NJ: Prentice Hall, 2013.

#### Periodicals

Communications of the ACM