RARITANVALLEYCOMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

ENGR 108 – INTRODUCTION TO COMPUTING
FOR ENGINEERS AND SCIENTISTS

I. Basic Course Information

A. Course Number and Title:
    ENGR 108 – Introduction to Computing for Engineers and Scientists

B. New or Modified Course: Modified

C. Date of Proposal: Fall 2016

D. Effective Term: Fall 2017

E. Sponsoring Department: Science and Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 4   Lecture: 2
    Laboratory: 2
    Out of class student work per week: 5

H. Prerequisites: MATH 112 – Precalculus I or equivalent

I. Laboratory Fees: Yes

J.   Name and Telephone Number or E-Mail Address of Department Chair at time of
     approval: Dr. Sarah Imbriglio, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisites: MATH 112 – Precalculus I or equivalent.

This is a one semester course intended to introduce engineering and science majors to the main features of MATLAB and its application to engineering and scientific problem-solving. MATLAB excels at computations involving matrices which are used extensively in many engineering disciplines.

Topics include an introduction to programming in MATLAB, including matrix operations, functions, arrays, loops and selection structures, working with data files and plotting.

Students can apply this knowledge to learning other programming languages, such as C, C++, and Pascal as well as use MATLAB as a tool in their other engineering classes.

III. Statement of Course Need

MATLAB, which stands for "Matrix Laboratory", is a computer programming language and software environment currently in use throughout the engineering community.
The ability to use tools such as MATLAB is quickly becoming a requirement for many engineering positions.

   A. This is a standard course in most engineering programs at 4-year institutions and is therefore needed to ensure the credibility and articulation of our engineering program.

   B. Computer lab practice is a critical tool for students to learn and master the MATLAB software.

   C. This course generally transfers as an engineering program requirement.

IV. Place of Course in College Curriculum

   A. This course is a Free Elective
   B. This course meets a program requirement for the Engineering Science AS degree and a program option for the Physics AS degree.
   C. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

   A. Overview of MATLAB
   B. MATLAB user interface
   C. Problem-solving methodologies
   D. Working with matrices and arrays
   E. Using built-in functions and user defined functions
   F. Working with various types of data files
   G. Numerical techniques
   H. Program design techniques
   I. Programming using operators, functions, conditional statements and loops
   J. Debugging
   K. Basic and advanced plotting

VI. General Education and Course Learning Outcomes

   A. General Education Learning Outcomes:

At the completion of the course, students will be able to:

1. Create MATLAB programs for solving engineering problems (GE-NJ 2, 4)
2. Generate and present program outcomes in a clear and logical manner (GE-NJ 1, 2)

B. Course Learning Outcomes:

At the completion of the course, students will be able to:

1. Convert engineering and science problems into executable MATLAB programs.
2. Modify existing MATLAB programs for user-specified purposes.
3. Check MATLAB program output for correctness.
4. Plot and present numerical data clearly and logically.

C. Assessment Instruments

The following assessment methods may be used:

1. Laboratory programming exercises (lab assignments)
2. Programming projects (in depth computer program and report assignment)
3. Computer programs (homework problems)
4. Exams (to assess the conceptual and practical understanding of MATLAB)

VII. Grade Determinants

Factors that may enter into the determination of the final grade
   A. Lab assignments
   B. Programming projects (longer programs than assigned for homework)
   C. Homework assignments
   D. Exams

Primary formats, modes, and methods for teaching and learning that may be used in the course:
   1. lecture/discussion
   2. computer-assisted instruction
   3. computer lab
   4. student collaboration

VIII. Texts and Materials

A. Suggested Textbook – *MATLAB for Engineers*, Holly Moore, latest edition, Pearson

B. MATLAB student version – available at http://www.mathworks.com/

Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.

IX. Resources

      A. http://www.mathworks.com/ – MATLAB homepage
      B. Computer lab with MATLAB software

X. Honors Option
      Not applicable.