RARITANVALLEYCOMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

ENGR 215 – DIGITAL LOGIC DESIGN

I. Basic Course Information

A. Course Number and Title: ENGR 215 – Digital Logic Design

B. New or Modified Course: Modified Course

C. Date of Proposal: Semester: Fall Year: 2025

D. Effective Term: Fall 2026

E. Sponsoring Department: Science and Engineering

F. Semester Credit Hours: 4

G. Weekly Contact Hours: 5 Lecture: 3
Laboratory: 2
Out of class student work per week: 7

H. ☒ Prerequisites: MATH 152 Calculus II; PHYS 151 Analytical Physics II
☐ Corequisites:

I. Additional Fees: No

II. Catalog Description

Prerequisites: MATH 152 Calculus II
PHYS 151 Analytical Physics II

This is a fundamental engineering course focusing on basic digital circuits using classical and modern design tools in preparation for advanced courses in electronic and computer engineering. Focus is on HDL (Hardware Description Language) and an integrated design environment platform. Offered in the Spring Semester Only.

III. Statement of Course Need

A. It is a standard course offered during the second year of electrical and computer engineering programs, and it is needed to ensure the credibility and transfer articulations of our engineering program.

B. The course has a laboratory component, as is commonly found within engineering programs. The laboratory offers the students the ability to work with equipment that they will see in further studies, and in their career work. The laboratory exercises are closely matched with the lecture material to both reinforce, and offer additional learning opportunities.

C. This course generally transfers as a requirement of engineering programs "dependent on the transfer institution" to III. C

IV. Place of Course in College Curriculum

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

V. Outline of Course Content

Topics Covered:

A. Number systems; Complement Number Representation
B. Boolean Algebra, Theorems, Standard Representation of Logic Functions
C. Combinational Circuits
D. Multiplexers, Exclusive OR Gates, and Parity Circuits
E. Sequential Circuits
F. D Latch; Flip-Flops
G. State-Machines
H. Counters, Shift Registers
I. HDL Structural and Behavioral Design
J. HDL Test Benches

Laboratory Experiments:

A. Introduction to Hardware
B. Combinational SSI Circuits
C. Combinational MSI Circuits
D. Four-Bit Arithmetic Unit
E. Sequential Circuits
F. State Machine Analysis
G. State Machine Synthesis

VI. A. Course Learning Outcomes

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

1. Analyze and design digital circuits. (GE 2, 3, 4)

2. Generate and present digital design outcomes in a clear and logical manner. (GE 2, 3, 4)
3. Understand elementary Boolean codes and work with the various Arithmetic Systems used for hardware arithmetic.
4. Design combinational and sequential circuits using Boolean algebra and Karnaugh Maps.
5. Work with a HDL language and use it to Design Field-Programmable Gate Arrays FPGAs

B. Assessment Instruments

1. Laboratory programming exercises (lab assignments)
2. Programming projects (in depth design project)
3. Homework problems
4. Exams (to assess the conceptual and practical understanding of MATLAB)

VII. Grade Determinants

A. Laboratory programming exercises
B. Programming projects
C. Homework problems
D. Exams

Given the goals and outcomes described above, below are the primary formats, modes, and methods for teaching and learning that may be used in the course:

A. lecture/discussion
B. computer-assisted instruction
C. lab exercises
D. student collaboration

VIII. Texts and Materials

A. Suggested Textbook
Digital Design, 5th Edition: M. Morris R. Mano & Michael D. Ciletti, ©2013, *Pearson*
B. HDL Design Environment – (provided in RVCC lab)
https://www.xilinx.com/support/university/boards-portfolio/xup-boards/DigilentNexys4DDR.html#overview

(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. Computer lab with HDL software
B. Access to a computer outside of class

X. : ☐Honors Course ☒ N/A