NEW YORK CITY COLLEGE OF TECHNOLOGY

Computer Engineering Technology Department | Course Outline

Course: CET 1250: Fundamentals of Digital Systems
Course Coordinator: Prof. Ohbong Kwon, PhD. **Revised on:** Spring 2025
Credits: 4 **This course is:** ☒Required ☐Elective ☐Selective Elective
Contact Hours: 6 **Class Hours:** 3 **Lab Hours:** 3 **Ind. Study Hours:** 0 **Internship Hours:** 0

Catalogue Description:
Students learn how to implement and analyze control functions and arithmetic operation using digital IC's. Computer techniques are used to simulate systems and for troubleshooting. Laboratory problem-solving through the synthesis, breadboarding and testing of such systems. State-of-the-art integrated circuits are used with students working with their individual digital trainers.

Pre-Requisites: CET 1150
Co-Requisites: CET 1250L

Required Texts [Title. Authors. Publisher. Year.]
1. **Digital Systems: Principles and Applications**, **12th Edition**. Ronald Tocci, Neal Widmer, and Greg Moss. Pearson. 2017. ISBN-13: 9780134220192

Other Suggested References or Supplemented Material
1. **Digital Electronics with VHDL, Quartus II Version**. William Kleitz. Pearson Prentice Hall. 2005. ISBN: 0131714902
2. **The Science of Electronics: Digital**. Thomas L. Floyd and David M. Buchla. Prentice Hall. 2004. ISBN: 013087549X

Course Learning Outcomes

Upon successful completion of this course, the student will be able to:
1. Understand the logic functions (AND, OR, NOT, and so on) through building simple circuits on their own digital trainer.
2. Analyze and design basic combinational SOP and POS logic systems.
3. Apply various simplification techniques to combinational logic.
4. Design and simulate simple combinational circuits using the Altera's Quartus II software.
5. Determine waveforms and state diagrams with SR, D and JK filp-flops.
6. Analyze and design basic sequential logic systems including counters.
7. Encode Boolean expression and truth table in VHDL using concurrent signal assignment statements.
8. Program Altera DE2 board with their schematic and VHDL designs.

General Education Outcomes

SKILLS/Inquiry/Analysis: Use creativity to solve problems

INTEGRATION/Integrate Learning: Resolve difficult issues creatively by employing multiple systems and tools.

VALUES, ETHICS, AND RELATIONSHIPS/Professional/Personal Development: Demonstrate Intellectual honesty and personal responsibility.

KNOWLEDGE/Lifelong learning/Acquire tools for lifelong learning—how to learn, how they learn, knowledge of resources.

Student Outcomes listed in the ETAC/ABET Criterion 3 Addressed in this Course

Student Outcomes	Level
1. An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline;	R
2. An ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;	R
3. An ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;	I
4. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results;	I
5. An ability to function effectively as a member of a technical team;	I

ABET Program Criteria: Computer Engineering Technology

Curricular Area	Level
a. Application of electric circuits, computer programming, associated software applications, analog and digital electronics, microcontrollers, operating systems, local area networks, and engineering standards to the building, testing, operation, and maintenance of computer systems and associated software systems.	R
b. Application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of computer systems and associated software systems.	I

***Legend**: I (Introduce), R (Reinforce) and E (Emphasize). Unmarked means not addressed.*

Brief list of topics to be covered

Week 1	Introduction and motivation and Number Systems and Codes
Week 2	Digital Electronic Signals and Switches
Week 3	Basic Logic Gates
Week 4	Basic Logic Gates
Week 5	Boolean Algebra and Reduction Techniques
Week 6	Boolean Algebra and Reduction Techniques
Week 7	Exclusive-Or and Exclusive-Nor Gates
Week 8	Midterm Exam
Week 9	Arithmetic Operations and Circuits
Week 10	Code Converters, Multiplexers, and Demultiplexers
Week 11	Flip-Flops and Registers
Week 12	Flip-Flops and Registers
Week 13	Counter Circuits and VHDL State Machines
Week 14	Shift Registers
Week 15	Final Exam