Course Name: Digital Circuits and Logic

Course Number: CST* E145

Credits: 4

Catalog description: A study of the elements of digital logic design, digital circuits, and the fundamentals of a modern digital system. It begins with an explanation of binary number systems, progresses through logical design and into PC systems. Laboratory experiments are used to provide practical experience.

Prerequisite: MAT*095 or placement beyond MAT*095 and CSA*E105 or permission of the instructor

or

Corequisite or Parallel: MAT*095 or placement beyond MAT*095 and CSA*E105 or permission of the instructor

General Education Competencies Satisfied:

HCC General Education Requirement Designated Competency Attribute Code(s):

None

Additional CSCU General Education Requirements for CSCU Transfer Degree Programs:

None

Embedded Competency(ies):

None

Discipline-Specific Attribute Code(s):

☐ **COMP** **Computer Science Elective**

Course objectives:

General Education Goals and Outcomes:

None

Course Specific Objectives:

1. Gain a theoretical understanding of binary elements and number systems
2. Be able to explain the relationship between a logical requirement, the number system and a practical logic implementation
3. Conduct a digital design through DeMorgan's theorem and a Karnaugh map reduction to a circuit implementation
4. Be able to choose circuit elements, including gates, arithmetic elements, registers and storage devices to synthesize a requirement
5. Successfully implement and run a logic simulation on the PC in a manner similar to that done in industry

Course Content:

1. Fundamental digital concepts and binary electronics
   a. Analog vs Digital
   b. Number Systems

2. Boolean algebra and combination logic
   a. Logic representation
   b. Reduction Theorems

3. Binary-based number circuit concepts for performing
   a. Digital Arithmetic
   b. Flow Charts

4. Flip-flops, counters and clock generation
   a. Basic concepts
   b. Simulation

5. Memory elements

6. Analog interfaces
   a. Analog to Digital and Digital to Analog Converters
   b. Real World Interfaces

7. Digital bus concepts and systems interaction
   a. Requirements Analysis
   b. Systematic design

Date Course Created:

Date of Last Revision: 04/03/2017