# Digital Electronics Course No. 21008 Credit: 1.0

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| **Student name:** |  | **Graduation Date:** |  |

Pathways and CIP Codes: **Engineering & Applied Mathematics (14.0101)**; Aviation Maintenance (47.0607) – Maintenance & Avionics Strand; Manufacturing (48.0000) - Maintenance Strand; Automation Engineering (15.0406); Networking and Telecommunications (11.0901)

Course Description: An **application level** course designed to teach students how to use applied logic in the development of electronic circuits and devices. Students may use computer simulation software to design and test digital circuitry prior to the actual construction of circuits and devices.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

Benchmark 1: Lab and Safety Equipment

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 1.1 | Students will identify hazards in the lab and locations of the MSDS, safety equipment, and resources. |  |
| 1.2 | Students will correctly calculate and set up lab equipment for safety, design, test, using Ohm’s law and circuit measurements. |  |

Benchmark 2: Understanding Electrical Concepts

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 2.1 | Students will understand how to prevent dangers from electric shock, including environmental concerns and precautionary measures |  |
| 2.2 | Students will define and explain direct and alternating currents along with components and schematics used in electronics circuitry. |  |

Benchmark 3: Analog and digital circuits

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 3.1 | Students will identify and differentiate digital and analog waveforms. |  |
| 3.2 | Students will build and test a free running clock and calculate output frequencies from observations on an oscilloscope. |  |

Benchmark 4: Logic Circuit Design

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 4.1 | Students will design and build logic circuits derived from Boolean expressions and truth tables |  |
| 4.2 | Students will use DE Morgan’s Theorem, Karnaugh mapping, NOR, NAND, and combinational logic solutions to reduce and simplify circuits. |  |
| 4.3 | Students will design, code, and build logic circuits to control different kinds of displays. |  |
| 4.4 | Students will control the flow of data by utilizing multiplexers and demultiplexers. |  |
| 4.5 | Students will design and implement logic circuits using programmable logic devices that define combinational circuit designs using logic compiler software. |  |
| 4.6 | Students will compare and contrast operation of RS flip-flops, D flip-flops, and J-K flip-flops. |  |
| 4.7 | Students will understand, design, and implement different circuits using synchronous, asynchronous, triggering, and timing using flip-flops. |  |
| 4.8 | Students will design modification counters using timing from asynchronous flip-flops. |  |
| 4.9 | Students will conduct experiments with shift registers for memory storage and arithmetic circuits. |  |
| 4.10 | Students will design both half and full adders from logic circuits to do simple addition and subtraction using binary numbers. |  |

Benchmark 5: Click or tap here to enter text.

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 5.1 | Students will appropriately select, size, and implement interface devices to control external devices. |  |
| 5.2 | Students will design and create programming to control the position of stepper motors and control speed and torque of servo motors. |  |
| 5.3 | Students will be able to formulate a flow chart to correctly apply basic programming concepts in the planning of a project. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

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