Digital Electronics (DE)

Mr. Steve Foote

2024-2025 Course Syllabus

E-mail: steve.foote@lsr7.net
STA Main Line: 816-986-3410
Phone: 816-986-3437
Attendance: 816-986-3413 or andrea.bisogno@lsr7.net
AM Session: 7:55 am - 10:00 am
PM Session: 11:50 am - 1:55 pm
Office Hours: 7:30 – 7:45 a.m., 2:00 – 3:00 p.m., or by appointment

COURSE DESCRIPTION: This course, designed by Project Lead The Way (PLTW), provides a foundation for students who are interested in electrical engineering, electronics, and circuit design. It provides a basic overview of the design of digital circuits. It also familiarizes students with topics such as combinational and sequential logic. The student will be exposed to circuit design tools used in industry, including logic gates, integrated circuits, and programmable logic devices. By taking Digital Electronics, the student will have a better understanding of the careers and areas within the business where they might thrive.

INSTRUCTIONAL PHILOSOPHY: This course is based on a series of activities and projects that reinforce the electronics field. Students will utilize materials developed for and utilized by industry professionals. The focus of the materials is to prepare the student in a sequential process that takes them through the development of the design process. Since the coursework is collegiate-level and focuses on current industry standards, professional conduct is required at all times.

ESSENTIAL STANDARDS:

1. Identify many of the common components used in electronics.
2. Understand the significance of the base 2 number system in digital electronics.
3. Characterize and troubleshoot circuits through calculations and measurements.
4. Translate a set of design specifications into a functional AOI combinational logic circuit following a formal design process.
5. Evaluate and determine when alternative design strategies are beneficial to a circuit's design or design process.
6. Describe and demonstrate how programmable logic devices (PLDs) are used in industry to design larger circuits that would be difficult or time consuming to breadboard.
7. Implement commonly used sequential circuit designs to execute tasks used regularly in electronics.
8. Design and implement common types of synchronous and asynchronous counters used in electronics and recognize where these types of counters might be applied in a digital circuit.
9. Use the design process associated with state machines to create a state machine design and implement the circuit.
10. Recognize and relate how microcontrollers represent the next evolution in circuit design to control real world systems.
11. Develop and test code (C++ and/or Python) to control systems and their components.

MAJOR ASSIGNMENTS/PROJECTS:

1. Daily Work/Tests
2. Analog Circuit Design
3. AOI Logic Circuit Design: Majority Vote
4. Universal Gates Circuit Design: Fireplace Control Circuit
5. Seven-Segment Display Circuit Design: Binary Calculator

6. Asynchronous Counter Circuit Design: Now Serving Display
7. Synchronous Counter Circuit Design: Sixty Second Timer
8. State Machine Circuit (S7) Design: Phone Number
9. State Machine Circuit (Pi-top) Design: Intruder Alert System & Traffic Light
10. Personalized Semester Project
11. PLTW End of Course Exam

ASSESSMENT PLAN: Daily and weekly formative assessments will be used to identify whether students are attaining the essential learning targets on a daily basis. Quizzes, skills exams, and knowledge exams will be utilized to prepare students for the PLTW End of Course (EOC) exam. Summative assessments will be given, including a comprehensive final at the end of the course that shows achievement of the essential standards and concepts accomplished.

GRADING POLICY: Grades will be figured using the Summit Technology Academy approved grading scale. Grades are cumulative throughout the semester. Semester grades (A1) will be based on the following:

1. Classwork/Homework: 20%
2. Projects/Engineering Notebook: 30%
3. Quizzes: 20%
4. Exams: 30%

A comprehensive final will comprise 10% of the semester grade (S1).

Note: Any assignment, be it a paper, quiz, etc., that is not turned in (hard copy and/or electronic) as per the due date and time or as prescribed will be recorded as a zero in PowerSchool.

The following standardized grading scale is used for STA:

A	95 -100	C	73 - 76
A-	90 - 94	C-	70 - 72
B+	87 - 89	D+	67 - 69
B	83 - 86	D	63 - 66
B-	80 - 82	D-	60 - 62
C+	77 - 79	F	59 & below (No Credit)

TUTORING/EXTRA HELP PLAN: STA utilizes a pyramid of interventions in order to ensure students successfully meet the course requirements. Tutoring or extra help can be obtained by contacting the STA teacher through email, phone or in person. The teacher and student will agree on the arrangements.

ATTENDANCE POLICY: Regular attendance reflects dependability. The experience gained by students in the laboratory cannot be duplicated in the event of absence. Summit Technology Academy's policy may differ from that of the sending school and will be in effect for the period of attendance at STA. Please reference the on-line STA Student Handbook for the most current policy. Absences must be reported by parents or guardians to STA by calling 816-986-3413 or email andrea.bisogno@lsr7.net. Andrea Bisogno is the attendance secretary at STA.

A student shall be allowed no more than nine (9) absences, excused or unexcused, per semester in any one class. When a student reaches 9 days, the school will send an informational letter to the parents, regardless of prior contact by phone or conference. The letter serves as notification of the number and

type of absences by the student in each class. On the tenth (10) absence, in any one class, the student will not earn credit for that class. Students will have the opportunity to work with their administrator or teacher to make up missed time prior to the end of the semester. If a student still has 10 or more absences at the conclusion of the semester the student will be required to complete an attendance waiver appeal. A waiver to maintain full credit must be submitted by the end of the semester. This waiver should include documentation of illness, funeral, or family emergency from a medical doctor, dentist, minister, or other official source. The waiver should be turned into the attendance office.

DUAL CREDIT OPPORTUNITIES: Offered to eligible students according to the Coordinating Board of Higher Education through University of Central Missouri. Students must apply to UCM, then enroll in

a. ENGT1010: AppliedElectronics with lab **(3 hours and 1 hour lab college credit)**
b. ENGT1050: Digital Principles and Applications **(2 hours and 1 hour lab college credit)***

*required for students in the MIC program

Enrollment deadlines: Spring– 1/28/24 Cost**:** $92 per credit hour

ELECTRONIC GRADEBOOK/POWER SCHOOL WEBSITE: Grades are updated on a weekly basis. The Power School website address is https://powerschool.lsr7.org/public/.

ACADEMIC LETTERING: Students who have earned a 94.5% or higher in a STA program for first semester and a 94.5% or higher grade at the time of the fifth grading period will receive the academic letter.

TARDY POLICY: A tardy will be issued in accordance with the student handbook. Students are on time if they are seated in the classroom at the scheduled time for the start of class.

DRIVING PRIVILEGES: Students are strongly encouraged to utilize bus transportation when provided. However, students are permitted to park on school premises with a valid STA or UCM parking permit. Student parking on-site is a privilege, and can be revoked. Students parking/driving to STA without permission from their sending school and STA will be subject to disciplinary action. Parking permits may be revoked if a student is frequently tardy or late to school. (See tardy or late to school policies.)

ELECTRONICS POLICY: No electronics or headphones are allowed in the classroom unless being used in the educational process or as directed by the instructor. Electronics should be placed in backpacks or purses and out of sight. Students are encouraged to interact and help one another when appropriate.

DAILY MATERIALS NEEDED:

- Engineering Notebook (provided by STA)
- Scientific calculator
- Pencil(s) and pen(s)
- Notebook, Folder, and/or Binder (personal preference)

TECHNOLOGY: Students are required to utilize technology for various assignments. Outside computer and internet access is required.

LATE WORK: Late work will be accepted on a case by case basis, and will require consultation with the teacher. In addition, late work may be subject to reduced credit.