![North Carolina Agricultural and Technical State University logo](logo)

COURSE SYLLABUS

College Name: College of Engineering

Department Name: Department of Electrical and Computer Engineering

Course Name: Microprocessor Laboratory

COURSE INFORMATION

- **Course Number/Section**: ECEN 357/060
- **Term:** Summer II 2023
- **Semester Credit Hours:**   1
- **Times and Days:**   TR   10:00 AM – 12:00 PM
- **Class Location:**   McNair Hall 229

INSTRUCTOR CONTACT INFORMATION

- **Instructor:** Dr. Walter M. Gilmore III
- **Office Location:** McNair Hall Rm 559
- **Office Phone:** TBA
- **Email Address:**   gilmore@ncat.edu

STUDENT HOURS

These are times students may visit the professor without an appointment to request the assistance they need.

NOTE: Students are responsible for reading, understanding and following the syllabus.

1:30 AM ☐ / PM ☒ – 2:30 AM ☐ / PM ☒

Monday ☐ Tuesday ☒ Wednesday ☐ Thursday ☒ Friday ☐

2:00 AM ☐ / PM ☐ – 4:00 AM ☐ / PM ☐

Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐

COURSE PREREQUISITES

ECEN 218: Digital Logic Laboratory

COURSE COREQUISITES

ECEN 351: Introduction to Microprocessor-Based Systems

ECEN 206: Instrumentation and Networks Laboratory

COURSE DESCRIPTION

This course provides practical experience in microprocessor hardware and software, interfacing, and applications. Microprocessor evaluation boards and development software are utilized throughout the course.

STUDENT LEARNING OBJECTIVES/OUTCOMES (SLO): On completion of this course, students should be able to:

1. **Utilize** an integrated development environment for programming a
   microprocessor/microcontroller

2. **Write** and **assemble** Assembly language programs for a
   target microprocessor/microcontroller

3. **Write** and **compile** C language programs for a target microprocessor/microcontroller

4. **Disassemble** machine code into assembly code using an IDE

5. **Verify** and **Debug** a program on a target microcontroller using both hardware and software

6. **Utilize** Flow charts as a tool to aid in writing programs

7. **Interface** the microprocessor with SSI and MSI logic circuits

8. **Setup** a user-friendly interface for the programs written

9. **Utilize** polling strategy for event-driven I/O

10. **Utilize** interrupt strategy for event-driven I/O

11. **Create** and **Access** simple data structures (e.g. arrays, stack, etc.) within MSP430
    programs

12. **Implement** a practical mixed signal, microcontroller-based system

REQUIRED TEXTBOOKS AND MATERIALS

REQUIRED MATERIALS:

1. Microcontroller Development Board:
   - MSP- EXP430FR2355 Launchpad from TI
   - Purchasing Information: https://www.ti.com/tool/MSP-EXP430FR2355
2. I/O Expansion Development Board:
   - Educational BoosterPack MKII from TI
   - Purchasing Information: https://www.ti.com/tool/BOOSTXL-EDUMKII
3. Small Breadboard Kit with Jumper Wires:
   - https://www.walmart.com/ip/TEKTRUM-SOLDERLESS-830-TIE-POINTS-EXPERIMENT-PLUG-IN-BREADBOARD-KIT-WITH-JUMPER-WIRES-FOR-PROTO-TYPING-CIRCUIT-ARDUINO/371726912

SACS and ABET Student Learning Objectives/Outcomes

SACS Outcomes:

SLO	Outcome Description
Goal 2: Critical Thinking Skills	Students completing assignments that will effectively use quantitative and qualitative analytical problem-solving skills appropriate for professionals in this field of study.
Goal 3: Disciplinary Expertise	Students completing assignments that will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study

ABET Outcomes:

Students who successfully complete this course will have demonstrated:

ECEN Outcome	Outcome Description
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic,
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

SUGGESTED COURSE MATERIALS

Suggested Readings/Texts: Getting Started with the MSP430 Launchpad, Adrian Fernandez and Dung Dang, Elsevier Inc., 2013, ISBN#: 9780124115880

Suggested Materials: TBD

GRADING POLICY

ASSIGNMENTS AND GRADING POLICY

90% and above	A		73% - 70%	C
89% - 87%	A-		69%	C-
86% - 84%	B+		68%	D+
83% - 80%	B		67%	D
79% - 77%	B-		66% - 0%	F
76% - 74%	C+			

GRADING ALLOCATION

Blackboard will display grades on a 100 point scale in the Weighted Average Column not the total. The
breakdown for the course scores is as follows:

Category	Weight
Attendance	10%
Lab Exercise Documentation	60%
Lab Project -Demo -Project Exam	**30%** 15% 15%

COURSE POLICIES

USE OF BLACKBOARD AS THE LEARNING MANAGEMENT SYSTEM

Blackboard is the primary online instructional and course communications platform. Students can access the course syllabus, assignments, grades, and learner support resources. Students are encouraged to complete a Blackboard orientation and log in daily to course.

MAKE-UP EXAMS

Make-up exams will only be offered to students with **excused** absences for the day of the original exam. The **credible written** excuse is to be provided on the first day of the student's return to class.

See << Update Academic Year >>*Undergraduate Bulletin:*
https://www.ncat.edu/provost/academic-affairs/bulletins/index.php

EXTRA CREDIT

TBD

LATE WORK

Any late assignment will be penalized by 5% per day until it is turned in.

SPECIAL ASSIGNMENTS

TBD

CLASS ATTENDANCE

Students are expected to attend class and participate on a regular basis in order to successfully achieve course learning outcomes and meet federal financial aid requirements. Class attendance in online courses is defined as active participation in academically-related course activities. Active participation may consist of course interactions with the content, classmates, and/or the instructor. Examples of academically-related course activities include, but are not limited to:

- Completing and submitting assignments, quizzes, exams, and other activities within Blackboard or through Blackboard (3rd-party products).

- Participating in course-related synchronous online chats, discussions, or meeting platforms such as Blackboard Collaborate in which participation is tracked.

CLASSROOM CITIZENSHIP

Courtesy, civility, and respect must be the hallmark of your interactions.

COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT

North Carolina A&T State University is committed to following the requirements of the Americans with Disabilities Act Amendments Act (ADAAA) and Section 504 of the Rehabilitation Act.
If you need an academic accommodation based on the impact of a disability, you must initiate the request with the Office of Accessibility Resources (OARS) and provide documentation in accordance with the Documentation Guidelines at N.C. A&T. Once documentation is received, it will be reviewed. Once approved, you must attend a comprehensive meeting to receive appropriate and reasonable accommodations. If you are a student registered with OARS, you must complete the Accommodation Request Form to have accommodations sent to faculty.

OARS is located in Murphy Hall, Suite 01. We can be reached at 336-334-7765, or by email at accessibilityresources@ncat.edu. Additional information and forms can be found on the web at https://www.ncat.edu/provost/academic-affairs/accessibility-resources/index.php.

Please note: Accommodations are not retroactive and begin once the Disability Verification Form is provided to faculty.

TITLE IX

North Carolina A&T State University is committed to providing a safe learning environment for all students—free of all forms of discrimination and harassment. Sexual misconduct and relationship violence in any form are inconsistent with the university's mission and core values, violate university policies, and may also violate federal and state law. Faculty members are considered "Responsible Employees" and are required to report incidents of sexual misconduct and relationship violence to the Title IX Coordinator. If you or someone you know has been impacted by sexual harassment, sexual assault, dating or domestic violence, or stalking, please visit the Title IX website

to access information about university support and resources. If you would like to speak with someone confidentially, please contact the Counseling Services 336-334-7727 or the Student Health Center 336-334-7880.

TECHNICAL SUPPORT

If you experience any problems with your A&T account, you may call Client Technology Services (formerly Aggie Tech Support and Help Desk) at 336-334-7195, or visit https://hub.ncat.edu/administration/its/dept/ats/index.php.

FIELD TRIP POLICIES / OFF-CAMPUS INSTRUCTION AND COURSE ACTIVITIES

If applicable:

Off-campus, out-of-state and foreign instruction and activities are subject to state law and university policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at https://www.ncat.edu/campus-life/student-affairs/index.php.

STUDENT HANDBOOK

https://www.ncat.edu/campus-life/student-affairs/departments/dean-of-students/student-handbook.php.

STUDENT TRAVEL PROCEDURES AND STUDENT TRAVEL ACTIVITY WAIVER

https://hub.ncat.edu/administration/student-affairs/staff-resources/studen_activity_travel_waiver.pdf

OTHER POLICIES *(e.g., Copyright Guidelines, Confidentiality, etc.)*

STUDENT HANDBOOK

https://www.ncat.edu/campus-life/student-affairs/departments/dean-of-students/student-handbook.php

SEXUAL MISCONDUCT POLICY

https://www.ncat.edu/legal/title-ix/sexual-harassment-and-misconduct-policies/index.php

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

https://www.ncat.edu/registrar/ferpa.php

STUDENT COMPLAINT PROCEDURES

https://www.ncat.edu/current-students/student-complaint-form.php

STUDENT CONDUCT AND DISCIPLINE

North Carolina A&T State University has rules and regulations that govern student conduct and discipline meant to ensure the orderly and efficient conduct of the educational enterprise. It is the responsibility of each student to be knowledgeable about these rules and regulations.

Please consult the following about specific policies such as academic dishonesty, cell phones, change of grade, disability services, disruptive behavior, general class attendance, grade appeal, incomplete grades, make up work, student grievance procedures, withdrawal, etc.:

- Undergraduate Bulletin
  https://www.ncat.edu/provost/academic-affairs/bulletins/index.php

- Graduate Catalog
  https://www.ncat.edu/tgc/graduate-catalog/index.php

- Student Handbook
  https://www.ncat.edu/campus-life/student-affairs/departments/dean-of-students/student-handbook.php

ACADEMIC DISHONESTY POLICY

Academic dishonesty includes but is not limited to the following:

1. Cheating or knowingly assisting another student in committing an act of cheating or other academic dishonesty;
2. Plagiarism (unauthorized use of another's words or ideas as one's own), which includes but is not limited to submitting exams, theses, reports, drawings, laboratory notes or other materials as one's own work when such work has been prepared by or copied from another person;
3. Unauthorized possession of exams or reserved library materials; destroying or hiding source, library or laboratory materials or experiments or any other similar actions;
4. Unauthorized changing of grades, or marking on an exam or in an instructor's grade book or such change of any grade record;
5. Aiding or abetting in the infraction of any of the provisions anticipated under the general standards of student conduct;
6. Hacking into a computer and gaining access to a test or answer key prior to the test being given. A&T reserves the right to search the emails and computers of any student suspected of such computer hacking if a police report of the suspected hacking was submitted prior to the search; and
7. Assisting another student in violating any of the above rules.

A student who has committed an act of academic dishonesty has failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basis for disciplinary action but may also affect the evaluation of a student's level of performance. Any student who commits an act of academic dishonesty is subject to disciplinary action.

In instances where a student has clearly been identified as having committed an act of academic dishonesty, an instructor may take appropriate disciplinary action, including a loss of credit for an assignment, exam or project; or awarding a grade of "F" for the course, **subject to review and endorsement by the chairperson and dean**.

ASSIGNMENTS AND ACADEMIC CALENDAR

MONTH	DAY	SUBJECT	READING IN TEXT, ACTIVITY, HOMEWORK, EXAM
1		Intro Development Hardware and Software	
2		Comparison of different embedded programming languages	
3		Multiplication and Division Algorithms Using Loops and Conditionals	
4		Multiplication and Division Subroutines with I/O	
5		Interrupt Service Routines with I/O	
6		Controlling sound and light with the joystick	
7		Serial communication to PC	
8		Project Demonstration	

* These descriptions and timelines are subject to change at the discretion of the instructor.