THE UNIVERSITY OF ARIZONA

SIE 370 Spring 2025 Embedded Computer Systems

Description: Boolean algebra, combinational and sequential logic circuits, finite state machines, simple computer architecture, assembly and C/C++ language programming, and real-time computer control.

Required Textbook: Provided **Free** by accessing the link in the **Library Tools** section of our SIE 370 D2L site.

- Blum, Jeremy. *Exploring Arduino, 2nd Edition.* Wiley, 2019.

Required Online Resources (Free)

1. All About Circuits Textbook: Digital
2. Arduino Official Online Reference Pages
3. Tinkercad

Reference: (Available online through UA Library (Free) Safari Books Online Database Collection)

- **https://libguides.library.arizona.edu/safaribooks**
  - UA users should sign in only with their UA email address (NO password), then login with their NetID when prompted.
  - Maxwell, Clive. *Bebop to the Boolean Boogie.* Newnes, 2008.
  - Petzold, Charles. *Code: The Hidden Language of Computer Hardware and Software*. Microsoft Press, 2000.

Equipment Requirements

- Laptop (for lab and in-class use, beginning first day)
- Arduino Uno R. 3 (for lab and in-class use, after the first week, please see the next bullet item)
- Component lists will be available soon. It is best to wait until the first week to purchase because it is usually much less expensive to buy an Arduino as part of a project kit. You will need the component list to make sure the project kit contains all the components you will need.

Expected Learning Outcomes:

1. Convert numbers between different number systems,
2. Reduce and optimize circuits using Boolean Algebra, Karnaugh Maps and applying digital logic,
3. Translate software implementation of a system into a hardware implementation or vice versa,
4. Design, develop, debug, deploy and run software on a microcontroller,
5. Use a microcontroller to interface with external hardware.

Course Assessments and Weighted Distribution

Assessment	Weight	Learning Outcome	Description
Class Participation	10 %	All	• Designed to provide practice, evoke, questions, and help self-assess progress and understanding. • Measures in-class engagement including participating by asking and answering questions, helping others, and

			submitting low-stake, ungraded / for-credit in-class activities given as practice.
Homework	15%	All	• Designed to provide practice, evoke, questions, and help self-assess progress and understanding. • Consists of more detailed practice that is similar to in-class activities, but usually much longer. Conventionally graded (e.g., A is 90 to 100%).
Lab Assignments	25%	All	• Less theory, more hands on, but both exist here. • Include instructions and requirements for the problem(s) to the solved. • Components include participation, pre-lab and post-lab reports.
Midterm Exam 2-Components: • Programming • Written	25%	All	• Comprehensive. • Programming components contain full instructions and requirements and will be uploaded to D2L before the time the Written component begins. • Written components will be written on paper and uploaded to D2L.
Final Exam 2-Components: • Programming • Written	25%	All	• Comprehensive. • Programming components contain full instructions and requirements and will be uploaded to D2L at the time agreed upon below. • Written components will be written on paper and uploaded to D2L.

Grading Scale and Distribution

Semester grades use Regular Grades:

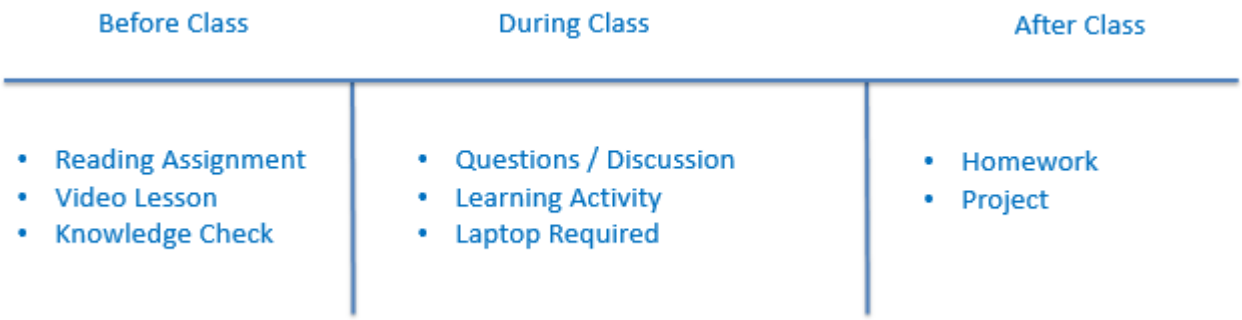
A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
E	0% - 59%

Course Format and Teaching Methods

The course will include lectures, in-class activities and discussion, projects, web-delivered content, and intermittent assessment.

Please make sure you visit the D2L site frequently to stay up to date. Any notices, changes, or corrections will be posted in the Announcements section of the course (Course Home) on D2L. All course information and materials will be posted on the site.

A quick overview of a typical class meeting is illustrated below:



There are very few lectures given during class. Most are pre-recorded, last 5 to 10 minutes, and are viewed prior to class. Class begins with questions and discussions based on what you want to discuss, have questions, or are curious about. If I have an agenda item to discuss, then I will cover that first so that we can move on to your interests. We will typically delve into a relevant learning activity, so please remember to bring your laptops to class. After class you will work on any assigned homework or project.

Active learning, partially represented by in-class activities mentioned in the last paragraph, reinforces important material, concepts, and skills. The activities I have designed for this course are experiential; based on real-world work that I have performed as an engineer and also assigned to engineering teams not as a learning experience, but as part of our work. This representative work allows you to apply what you have learned, and what you are actively learning, to promote a personal bond between you and that work. I've also found that I don't know what questions I have until I try something firsthand.

Software:

We will use the free download Arduino IDE (Integrated Development Environment) to write C/C++ based programs called sketches. Online software tools will be used to simulate circuit and Arduino development. We will work together in class and in lab to review any required software and installation instructions.

Final Examination or Project

Final Exam Arduino Component	Wednesday May 7th by 11:59 PM
Final Exam Written Component*	Friday May 9th from 1:00pm - 3:00 PM

* This date and time is set by the Office of the Registrar and states that the policy "As Confirmed by the Faculty Senate: No deviation from the exam schedule, once it is published, is authorized."

Official Final Exam Schedule University of Arizona Registrar

Absence and Class Participation Policy

Unless it is an emergency, you are required to send a request via email well in advance of any class or deadline that you might miss. If possible, I will work with you to help you complete missed work.

Participating in the course and attending class meetings and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings.

If you miss a class meeting you are responsible for any in-class assignments missed. If the assignment was to be handed in, then you are responsible for handing in the work after notifying me. It is best if you hand in the work before the start of the next class meeting time.

I have only added course-specific and highlights here. The link to the full University policy concerning Class Attendance, Participation, and Administrative Drops is available at the link provided under the heading below, University Policies.

Class Meeting Recordings

For class meeting recordings, which are used at the discretion of the instructor, students must access the content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings, personally recording a meeting, or using them in a manner inconsistent with University of Arizona values and educational policies are subject to suspension or civil action.

Use of Generative AI

In this course only, students may use generative artificial intelligence / large-language-models tools for non-graded learning, but **never** for Homework, Labs, or Exam Components. The student is responsible for investigating and deciding the accuracy, credibility, and source of any information they gain from these tools.

Use of these tools on Homework, Exams, or Projects is considered a violation of the Code of Academic Integrity and subject to the most severe sanctions listed in the section below, **Code of Academic Integrity**.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work / exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism, available at http://new.library.arizona.edu/research/citing/plagiarism.

Re-distributing class notes and / or other course materials in any way is not permitted without the instructor's express written consent. This includes student notes or summaries that substantially reflect lectures or other materials. These resources are made available only for personal use by students.

Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions and may also constitute copyright infringement. Course sanctions include notation of the violation(s) on the student's transcript, a failing grade in the course, or revocation of a student's degree, suspension or expulsion from the program, department, college, or University.

University Policies

The university policies on absence and class participation, threatening behavior, accessibility and accommodations, academic integrity, and non-discrimination and anti-harassment may be found at https://academicaffairs.arizona.edu/syllabus-policies.

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change as deemed appropriate by the instructor.