CS 2810: Computer Organization and Architecture

Spring 2022 Syllabus

Required of students pursuing a Computer Science degree or emphasis, open to any student with a strong interest in computer programming. Covers digital hardware design and systems programming, including numeric representations, digital logic, processor architecture, instruction sets, assembly language, and other low-level programming topics.

Prerequisites

CS 1410 with a C or better

Fees

Computer lab access fee: $20, used to assist in maintaining computing infrastructure.

Sections

One section:

1. TR 10:30–11:45 AM in Smith 109
   CRN: 20220
   Final exam: Thursday, May 5 at 9:00 AM

Instructor

Instructor: Dr Russ Ross
Email: russ@dixie.edu
Phone: 435-773-5952 (note: email preferred)
Office: North Burns 226
Office Hours: MWF 11:00 AM–noon, TR 1:00–2:00 PM

Course learning outcomes

At the successful conclusion of this course, students will be able to:

1. Convert between number systems including binary, hexadecimal, octal, and decimal.
2. Debate and compare the design of computer instruction sets and assembly languages.
3. Compose low-level solutions to programming problems that interact directly with the operating system.
4. Generate structured assembly language solutions to algorithmic problems.

Resources

Texts

There are two recommended texts for this class:

- Computer Organization and Design RISC-V Edition: The Hardware Software Interface
  by David Patterson and John Hennessy
  ISBN: 9780128203316

- The C Programming Language, 2nd Edition
  by Brian Kernighan and Dennis Ritchie
  ISBN: 9780131103627

Computers

Students are expected to have access to a personal computer running Linux (this includes the Windows
Subsystem for Linux) or Mac OS. The instructor will provide basic help setting up the tools and environment for homework, but students are generally responsible for installing and configuring software as well as performing basic troubleshooting and maintenance tasks as needed.

**Course Web Site**

This course has an accompanying website. You are responsible for announcements, the schedule, and other resources posted on the website. Grades will be managed using Canvas.

**Assignments and exams**

**Assignments**

There will be a project due roughly every week during the semester. Projects are designed to take 10+ hours of work for successful completion. These assignments will involve various activities to promote a deeper understanding of the course materials. Most of the projects build upon previous work, so students who fall behind will not be able to complete the course successfully.

It is important that you start early and get each of your assignments done before its due date. Many problems will take much longer to solve in a single sitting than in many shorter sessions. Give yourself time to think; sleep on difficult problems. Finish early so you can go back and refine your initial approach.

**Exams**

This course has a midterm exam and a final exam. These exams will consist of questions based on the projects, reading, and lecture material.

**Grading**

Assignments, exams, and in-class activities each contribute to your point total. The assignments will comprise 60% of the total, the midterm exam 20%, and the final exam 20%.

Letter grades are assigned based on the percentage of possible points attained, according to the following chart:

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<thead>
<tr>
<th>Minimum Percentage</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>93</td>
<td>A</td>
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<tr>
<td>90</td>
<td>A-</td>
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<td>87</td>
<td>B+</td>
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<td>83</td>
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**Course Policies**

**Attendance**

Students are responsible for material covered and announcements made in class. School-related absences may be made up only if prior arrangements are made. The class schedule presented is approximate. The instructor reserves the right to modify the schedule according to class needs. Changes will be announced in class. Exams and quizzes cannot be made up unless arrangements are made prior to the scheduled time.

Occasional absences are acceptable as long as the student keeps up with assignment work. Students who miss more than two consecutive weeks of class or who miss more than 20% of scheduled classes during the semester without making prior arrangements will receive a failing grade. Students who miss any scheduled exam (including midterm exams and the final exam/presentation) or fail to complete a final project without making prior arrangements will receive a failing grade.
This course can only be completed by attending classes and completing all assigned work to a satisfactory level. There is no procedure for testing out of the class.

**Laptops**

Electronics—including laptops—in class have been demonstrated to have a negative impact on student learning (see Shriram Krishnamurthi's writeup for background). This class has a NO DISTRACTIONS policy, with a few exceptions:

1. When I ask you to use your laptop (or phone) for a specific activity in class. In this case you are permitted to use it for the duration of the activity, but not during the rest of the class.
2. If you need a laptop to accommodate a disability. If this is the case, please talk to me in advance and please visit the Disability Resource Center to document your need. To help other students in the class, please sit near one of the edges so your laptop does not distract other students more than necessary.

This policy extends to phones, tablets, and other electronic devices. I encourage you to pay full attention to class and take notes on paper.

**Time Commitment**

Courses should require about 45 hours of work per credit hour of class. This class will require about 135 hours of work on the part of the student to achieve a passing grade, which is approximately 9 hours per week. If you do not have the time to spend on this course, you should probably rethink your schedule.

**Late Policy**

The lateness policy of this course is designed to encourage students to stay up-to-date on the current topics and assignments. Each assignment has a soft due date (when students are expected to complete it) and a cutoff date (after which submissions are no longer accepted).

Assignments may be made up after the cutoff date, subject to the following constraints:

1. No old assignments are accepted until the current, active assignment is complete. Students should focus on the current projects, instructional materials, and in-class activities, and only go back to work on older assignments when they are fully caught up or even ahead on current assignments.
2. Old assignments (anything accepted after the initial cutoff date) will be subject to a 25% penalty, which may be waived one time.
3. No late work will be accepted more than a month after its original due date.

**Collaboration**

Limited collaboration with other students in the course is permitted. Students may seek help learning concepts and developing programming skills from whatever sources they have available, and are encouraged to do so. Collaboration on assignments, however, must be confined to course instructors, lab assistants, and other students in the course. Students are free to discuss strategies for solving programming assignments with each other, but this must not extend to the level of programming code. Each student must code his/her own solution to each assignment. See the section on cheating.

**Cheating**

Cheating will not be tolerated, and will result in a failing grade for the students involved as well as possible disciplinary action from the college. Cheating includes, but is not limited to, turning in homework assignments that are not the student’s own work. It is okay to seek help from others and from reference materials, but only if you learn the material. As a general rule, if you cannot delete your assignment, start over, and re-create it successfully without further help, then your homework is not considered your own work.

You are encouraged to work in groups while studying for tests, discussing class lectures, discussing algorithms for homework solutions, and helping each other identify errors in your homework solutions. If you are unsure if collaboration is appropriate, contact the instructor. Also, note exactly what you did. If your actions are determined to be inappropriate, the response will be much more favorable if you are honest and complete in your disclosure.

Where collaboration is permitted, each student must still create and type in his/her own solution. Any kind of copying and pasting is not okay. If you need help understanding concepts, get it from the instructor or fellow classmates, but never copy another’s code or written work, either electronically or visually. The line
between collaborating and cheating is generally one of language: talking about solutions in English or other natural languages is usually okay, while discussions that take place in programming languages are usually not okay. It is a good idea to wait at least 30 minutes after any discussion to start your independent write-up. This will help you commit what you have learned to long-term memory as well as help to avoid crossing the line to cheating.

**Special COVID-19 policies**

Students are strongly encouraged to get vaccinated and to wear a face covering that covers both mouth and nose in class and when working in the Smith Computing Center or visiting faculty offices. Students who are ill for any reason should avoid coming to class or otherwise coming into contact with other people, and should work with other students to get notes from missed classes.

**College Policies**

Click on this link: [https://calendar.dixie.edu/](https://calendar.dixie.edu/) for the official academic calendar, which has several important dates you should be aware of.

Click on this link: [https://employees.dixie.edu/faculty-resources/required-elements-in-dsu-syllabi/](https://employees.dixie.edu/faculty-resources/required-elements-in-dsu-syllabi/) and scroll down to the section starting with “Important Links” for links to resources and policies that apply university wide.