CDA 3104 – Computer Organization and Assembly Language Programming

Fall 2020 - CRN: 84286

# Meeting Information:

Class: T/TR -- 6:00 pm - 7:15 pm

**Final**: None

# Instructor Information:

***Paul Allen***

Email: **Message in Canvas**

Phone: Message in Canvas

Office location: tba, **by appointment only**

Office Hours: **Request via Canvas**

# Course Catalog Description:

Covers the organization, architecture, and microarchitecture of computer systems. Topics include computing machine instruction sets and register structures, programming in assembly language, tradeoffs in machine implementation and performance, computer peripherals, and a register transfer level simulation of an elementary computer system.

# Prerequisites:

* COP 2006 with a minimum grade of C and CDA 3200 with a minimum grade of C

# Required Course Materials:

#### TEXTBOOK (Required)

* *The AVR Microcontroller and Embedded Systems Using Assembly And C*, 2nd Edition, by Muhammad Ali Mazidi, Sepehr Naimi,Sarmad Naimi, Pearson Edu*.  ISBN13: 9780997925968.*

#### SOFTWARE (Required)

#### Atmel Studio 7 IDE - <https://www.microchip.com/mplab/avr-support/atmel-studio-7>

#### HARDWARE (Required)

* Arduino Uno R3 (or equivalent)
* Basic electronic components to include: breadboard, wires, resistors, capacitors, transistors, switches, etc., and optional sensors.
* Recommended kit: ELEGOO UNO Project Super Starter Kit with Tutorial and UNO R3 - <https://www.amazon.com/gp/product/B01D8KOZF4/ref=ppx_yo_dt_b_asin_title_o01_s01?ie=UTF8&psc=1>

# Course Learning Outcomes

Upon successful completion of this course, the student will be able to:

* Understand the basic microcontroller functionality and how it’s used in embedded systems.
* Be able to write assembly language code for the ATMEL AVR family of microcontrollers.
* Be able to program the various microcontroller features such as hardware interrupts, timers, I/O ports and serial communications.
* Be able to design circuitry using simple electronics such as using resisters, capacitors, transistors, diodes, relays, and a power supply in the context of embedded systems.

# Grading

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ASSIGNMENTS** | **%** |  | **SCORE** | **GRADE** | **GPA** |
| Assignments | 30 |  | 92 – 100 | A | 4.00 |
| Tests | 30 |  | 87 – 91 | B+ | 3.25 |
| Quizzes | 15 |  | 82 – 86 | B | 3.00 |
| Project | 25 |  | 79 – 81 | B– | 2.75 |
|  |  |  | 77 – 78 | C+ | 2.25 |
|  |  |  | 70 – 76 | C | 2.00 |
|  |  |  | 60 – 69 | D | 1.00 |
| **Total** | **100** |  | 0 – 59 | F | 0.00 |

# Attendance

Attendance on live lectures is required.  No makeup will be given for missed classes, quizzes or exams, unless a case is made in advance with the instructor's approval. Refer to Academic Catalog: Attendance: <http://www.fgcu.edu/Catalog/regdetail.asp?FMID=Registration+and+Records&page=9>

# Working Independently

**NO assignment is a group assignment in this course**. Students are NOT allowed to collaborate on assignments. It is cheating to see other classmates’ programs or let other classmates to see yours. This does not mean you cannot discuss anything about assignments with your classmates. But programming must be individual work.

\*\*\* IMPORTANT \*\*\*

If two submissions are found to be similar, the grades of both people will be zero for that assignment. If caught again, you will fail this class. Additionally, I am supposed to report any academic sanction to the Dean of Students. This report will be in your conduct file.

# Tentative Schedule

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Week | Begin | M | T | W | T | F | Reading | Subject |
| 1 | 8/17 | R | L |  |  |  | Ch. 0 | Introduction to Computing |
| 2 | 8/24 | R | L |  |  |  | Ch. 1 | The AVR Micro-controller: History and Features |
| 3 | 8/31 | R | L |  |  |  | Ch. 2 | AVR Architecture and Assembly Language Programming |
| 4 | 9/7 | Labor Day | | RR | L |  | Ch. 3 | Branch, Call, and Time Delay Loop |
| 5 | 9/14 | R | L |  |  |  |  | DC Circuit Theory and Components |
| 6 | 9/21 |  | X |  |  |  |  | Test 1 |
| 7 | 9/28 | R | L |  |  |  | Ch. 4 | AVR I/O Port Programming |
| 8 | 10/5 | R | L |  |  |  | Ch. 5 | Arithmetic, Logic Instructions, and Programs |
| 9 | 10/12 | R | L |  |  |  | Ch. 6 | AVR Advanced Assembly Language Programming |
| 10 | 10/19 |  | L |  |  |  |  | Chapter 5 & 6 continued |
| 11 | 10/26 | R | X |  |  |  |  | Test 2 |
| 12 | 11/2 | R | L |  |  |  | Ch. 13  Ch. 14 | ADC, DAC, and Sensor Interfacing  Relay, Optoisolator, and Stepper Motor Interfacing with AVR |
| 13 | 11/9 | R | L | Vet |  |  | Ch. 15 | Input Capture and Wave Generation in AVR |
| 14 | 11/16 | R | L |  |  |  | Ch. 16 | PWM Programming and DC Motor Control in AVR |
| 15 | 11/23 | R | L |  | Thanksgiving | | App. I | Passing Arguments into Functions |
| 16 | 11/30 |  | P |  |  |  |  | Final Project |
| 17 | 12/7 | Finals | | | | |  |  |

The above table provides a tentative schedule of due dates for reading assignments (R), live lectures (L), exams (X), and the final project (P). More details will be provided online and in lectures.

**How Would I Help with Your Debugging?**

I welcome you when you bring me or email me a piece of program which is not working, and you want to find out why not. But you should know that one of the reasons you are in a programming course is to improve your debugging skills so that you do not need another’s help eventually.

So, my help will address what you should do to debug, instead of what and where the bugs are. In other words, my way of working with you resembles how the writing center works.

**Communication**

Every student is responsible for checking his/her FGCU email at least once a day. The instructor will respond to your emails within 24 hours except weekends and holidays.

**Academic Integrity Statement and Statement for Students with Disabilities**

* Academic Dishonesty/Cheating Policy: "All students are expected to demonstrate honesty in their academic pursuits. The university policies regarding issues of honesty can be found under the "Student Code of Conduct" on page 11, and under "Policies and Procedures" on pages 18 - 24. of the Student Guidebook. All students are expected to study this document which outlines their responsibilities and consequences for violations of the policy. "
* Disability Accommodations Services: Florida Gulf Coast University, in accordance with the Americans with Disabilities Act and the university’s guiding principles, will provide classroom and academic accommodations to students with documented disabilities. If you need to request an accommodation in this class due to a disability, or you suspect that your academic performance is affected by a disability, please see me or contact the Office of Adaptive Services. The Office of Adaptive Services is located in Howard Hall 137. The phone number is 590-7956 or TTY 590-7930

**Center for Academic Achievement**

The Center for Academic Achievement (CAA) offers various academic success programs to assist you in reaching your academic goals in a student-centered learning environment. CAA services are for all FGCU students and include:

* **Academic Coaching**: Individual or group sessions facilitated by CAA Academic Success Coordinators who discuss relevant success skills to enhance your academic experience.   
  Coaching topics include -Time Management, Study Habits, Goal Setting, Motivation, and Organization.
* **Tutoring**: Appointment and Drop-in, peer-led tutoring for math, science, and economics. Check our website for specific courses and times https://www2.fgcu.edu/CAA/schedules.asp.
* **Supplemental Instruction (SI)**: SI leaders are assigned to specific course sections and hold sessions three times per week for 50 minutes in the Library. Sessions typically focus on the most difficult content in the course. Visit <https://www2.fgcu.edu/CAA/si.html> for full list of courses and schedules.
* **SOAR to Success Workshops**: Interactive workshops focusing on college success topics.

We invite you to visit https://www2.fgcu.edu/caa/ to make a **tutoring** and or **coaching** appointment, and get schedules for **supplemental instruction** and **workshops**. You also can stop by our office in Library 103 to pick up a schedule in person and make coaching appointments. We also have walk-in coaching sessions on Friday! Follow us @fgcu\_CAA.

**Important Dates**

Class Begins: August 17

Drop/Add Deadline: August 21

Labor Day (no classes): September 7

Study Day (no classes): September 8

Withdraw for 25% Refund: September 11

Withdraw w/o academic penalty:  November 6

Veteran’s Day (no classes) November 11

Thanksgiving (no classes) November 26-28