Instructor: Mr. Collin Timmons  
Office: 207H Cole STEM Building  
Office Hours: MW: 1-3 PM, TR: 12 PM – 2 PM, or by appointment  
Class Meetings: TR 2:00 – 3:40 PM, Room 103 Cole STEM Building  
Course Home Page: https://D2L.sfasu.edu

Course Description:
Microprocessor architecture, programming and interfacing. Introduction to assembly language programming, microcomputers, microcontrollers, instruction set, chip interfacing, addressing modes, interrupts, input/output and communication. Prerequisite: (EGR 343 or PHY 343) and CSC 102.

Text and Materials:
Devices Datasheets

Course Calendar:
On average, for EGR344, each student should spend 6 hours per week completing homework and labs, reading material, and studying.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 26</td>
<td>Microprocessor Architecture, and Assembly</td>
</tr>
<tr>
<td>2</td>
<td>Sep 2</td>
<td>PIC Architecture, I/O Ports, and Programming</td>
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<tr>
<td>3</td>
<td>Sep 9</td>
<td>Timer, and LCD</td>
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<tr>
<td>4</td>
<td>Sep 16</td>
<td>Motors, Servos, LEDs, and PWM</td>
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<tr>
<td>5</td>
<td>Sep 23</td>
<td>Motors, Servos, LEDs, and PWM Exam 1 (Weeks 1-3)</td>
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<tr>
<td>6</td>
<td>Sep 30</td>
<td>Programming the PIC using C++</td>
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<tr>
<td>7</td>
<td>Oct 7</td>
<td>Analog-to-Digital Conversion</td>
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<tr>
<td>8</td>
<td>Oct 14</td>
<td>Analog-to-Digital Conversion</td>
</tr>
<tr>
<td>9</td>
<td>Oct 21</td>
<td>Interrupts</td>
</tr>
<tr>
<td>10</td>
<td>Oct 28</td>
<td>Interrupts Exam 2 (Weeks 5-8)</td>
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<tr>
<td>11</td>
<td>Nov 4</td>
<td>I2C</td>
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<tr>
<td>12</td>
<td>Nov 11</td>
<td>I2C</td>
</tr>
<tr>
<td>13</td>
<td>Nov 18</td>
<td>SPI</td>
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<tr>
<td>14</td>
<td>Nov 25</td>
<td>Thanksgiving</td>
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<tr>
<td>15</td>
<td>Dec 2</td>
<td>SPI</td>
</tr>
<tr>
<td>16</td>
<td>Dec. 9</td>
<td>Exam 3 (Weeks 9-15)</td>
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Assignments:
The assignments will consist of the laboratory experiments. The student has a whole week to have a functional system capable of producing the expected output. The System is due at the beginning of the next laboratory. The students will be required to complete the following:
- Submit the code using D2L dropbox
- Demonstrate the functionality of the system
In order to know how these assignments will be graded, please refer to the laboratory procedure grading rubric.

To encourage students to debug their work before asking the instructor for help, a penalty of 2% pts will be applied if the instructor finds the bug in under 2 min. The instructor reserves the right to wave the debug penalty depending on the specific bug.

Quizzes:
Quizzes will be posted on D2L. The idea is to reinforce knowledge from lecture, and laboratories.

Exams:
There will be a total of three regular exams during the semester. The exams will be based on the assignments, and the materials covered during the lecture.

Laboratory Reports:
Two laboratory reports will be required during the semester. The first will be at the beginning of the semester, and the last at the end of the semester. The reports will be written based on the results from the laboratory procedures.

Grading Policy:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>35%</td>
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<tr>
<td>Lab Reports</td>
<td>20%</td>
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<tr>
<td>Attendance</td>
<td>5%</td>
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<tr>
<td>Quizzes</td>
<td>20%</td>
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<tr>
<td>Exams</td>
<td>20%</td>
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</table>

Late Policy
Any assignment should be returned in time. In the case that the assignment is returned late it will be affected by the following policy:

<table>
<thead>
<tr>
<th>Late</th>
<th>Deduction</th>
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<tbody>
<tr>
<td>than 2 hours</td>
<td>5</td>
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<tr>
<td>than 2 hours less than 12</td>
<td>10</td>
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<tr>
<td>than 12 hours less than 24</td>
<td>20</td>
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<tr>
<td>than 24 hours less than 48</td>
<td>50</td>
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<tr>
<td>than 48 hours</td>
<td>100</td>
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</table>

Homework Guidelines
As engineers you should learn how to be organized, you will need to present reports and results to your superiors and these need to be professional. For that reason, you will need to start learning how to be organized. The homework should be returned complying with the following format:

1. Use clean paper that will scan properly
2. Name should be on the top left corner
3. Pages should be numbered on the top right corner using the following format “3/10”
4. Problems should be organized and in order
5. Problem number should be clear and readable
Failing to comply with any of these will result in a **10 point** deduction.

**Attendance Policy:**
Attendance will be taken at the beginning of each class. Five points had been allocated for attendance. I understand that things happen, and you are not able to attend class a couple of times. Therefore, you are allowed to miss only 3 lectures without deduction.

**General Education Core Curriculum Objectives/Outcomes (EEO)**
There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.

**Academic Integrity (A-9.1)**
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp)

**Withheld Grades Semester Grades Policy (A-54)**
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

**Students with Disabilities**
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/).
EGR 344 – Microcomputer Interfacing (Selected Elective)

Course Description:
Microprocessor architecture, programming and interfacing. Introduction to assembly language programming, microcomputers, microcontrollers, instruction set, chip interfacing, addressing modes, interrupts, input/output and communication.

Prerequisites: EGR 343 or PHY 343  
Co-Requisites: None

Credits: 3 Hours (Lecture: 2 Hours, Laboratory: 1 Hours)

Instructor: Collin J. Timmons

Textbook: Devices datasheets.

Supplemental Materials: None

Topics Covered:
Computer Architecture, Memory Organization, PIC Architecture, Assembly, Digital I/O Ports, Analog Ports, Digital-to-Analog Conversion, EEPROMs, Timer Modules, PWM, Serial Peripheral Interface (SPI), Inter-Integrated Circuit (I2C).

Course Learning Outcomes
By the end of the course, a successful student will be able to:
1. Describe the architecture used in PIC microcontrollers. (SO-1)
2. Program a PIC microcontroller using assembly, and C++. (SO-1)
3. Use digital I/O ports to interact with peripherals. (SO-2)
4. Use a LCD screen to display information using a PIC. (SO-6)
5. Measure analog signal using the PIC (SO-6).
6. Explain the process of Digital-to-Analog Conversion. (SO-1)
7. General PWM signal to control devices such as: Motors, LEDs, Servos, etc. (SO-2)
8. Explain how PWM signal are used to control external devices. (SO-1)
9. Use Serial Peripheral Interface (SPI) protocols to communicate with external devices. (SO-2)
10. Describe how the Serial Peripheral Interface (SPI) protocol works. (SO-1)
11. Use Inter-Integrated Circuit (I2C) protocol to communicate with external devices. (SO-2)
12. Describe how the Inter-Integrated Circuit (I2C) protocol works. (SO-1)
13. Use logic analyzers to debug digital signals. (SO-6)
14. Learn how new peripherals work by reading datasheets, and using them to fabricate integrated systems. (SO-7)
15. Write effective laboratory reports. (SO-3)
**Student Outcomes**

Graduates of the program will possess:

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 judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts
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
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies