



ME6408

# ME 6408: ADVANCED MECHATRONICS

Instructor: Prof. I. Charles Ume

Phone: 404-894-7411

Office: MARC Building, Room 453

Office Hours: Wednesday 4:00 pm to 5:00 pm, or by appointment

Class Meets: TR 1:35 pm to 2:55 pm

Class Location: Instructional Center 219

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ME6408

## **ME 6408**

### **ADVANCED MECHATRONICS**

**Focusing on semester long Team Projects, designing and building intelligent machines and smart products.**

**Advanced Mechatronics, Georgia Tech**



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**Web Pages:**

Course: [http://www.me.gatech.edu/mechatronics\\_course](http://www.me.gatech.edu/mechatronics_course)

Lab: [http://www.me.gatech.edu/mechatronics\\_lab](http://www.me.gatech.edu/mechatronics_lab)

**Prerequisite:**

ME4447: Microprocessor Control of Manufacturing Systems,

ME6405: Introduction to Mechatronics or Equivalent or

With permission of the instructor

**Text:**

1. *Mechatronics*, by Sabri Cetinkunt, published by Wiley
2. *Basic Microprocessors and the 6800*, by Ron Bishop
3. CPU12RG Reference Guide
4. MC9S12C Family Reference Manual
5. MC9S12C32 Device User Guide
6. S12CPUV2 Reference Manual
7. Every group of 3 students is required to purchase an Axiom CML-12C32 and bread board.



## **Reference Text**

1. *Introduction to Mechatronics Design*, by Carryer, Ohline and Kenny, published by Prentice Hall, 2010.
2. *Mechatronics: Electronic Control Systems in Mechanical Engineering*, by W. Bolton
3. *Introduction to Mechatronics and Measurement Systems, Second Edition*, by David G. Alciatore and Michael B. Hstand
4. *Mechatronics: A Foundation Course*, by Clarence W. de Silva, CRC Press, 2010.
5. *Mechatronics System Design, 2<sup>nd</sup> Edition*, by Devdas Shetty and Richard A. Kolk, Cengage Learning, 2011.



## Syllabus:

<b>Lecture Topics and Other Timelines</b>
<b>Mechatronic Systems (Ume-Jan. 10)</b>
<b>Transducers, Sensors/Sensor Fusion (Ume - Jan. 12 &amp; 17)</b>
<b>Electronic &amp; Machine Shops Briefs (Graham &amp; French-Jan. 19)</b>
<b>Group Project Choices (Sterling- Jan. 19)</b>
<b>Actuators, and Mechanical Drives:</b> <ul style="list-style-type: none"><li>• Intro. to Hydraulic &amp; Pneumatic Sym. (Ume - Jan. 24)</li><li>• Overview of Hydraulic Technology (Prof. Paredis-Jan. 26)</li></ul>
<b>Project Proposal and Timelines: Jan. 26</b>
<b>Group Meeting with Prof. Ume to Refine Project Proposals: Over One Week Period</b>
<b>Short Test #1 (Jan. 31)</b>
<b>Actuator: Piezoelectric Actuator (Prof. Ueda - Feb. 2)</b>
<b>Motion Control (Prof. Singhose - Feb. 7)</b>
<b>Modeling of Mechatronic Systems (Prof. Sadegh - Feb. 9)</b>
<b>Power Rectifiers (Ume - Feb. 14)</b>
<b>Short Test #2 (Feb. 16)</b>
<b>First Interim Project Report: Feb. 28</b>
<b>Midterm Presentation: March 15</b>
<b>Second Interim Report: April 3</b>
<b>Final Project Presentation and Report : April 24</b>





## Grading:

Short Test 1 15% (Jan. 31)

Short Test 2 15% (Feb. 16)

(Each test is given next class meeting following last lecture)

### Final Project Deliverables:

- Proposal and Timeline (Jan. 26)
- First Interim Report 7.5% (Feb. 28)
- Midterm Presentation 15% (Mar. 15)
- Second Interim Report 7.5% (Apr. 3)
- Final Presentation and Report 40% (Apr. 24)

Since this is a team project intensive course, periodic evaluations are needed to ensure all groups are on track towards completing their projects. Each group will submit a 1-2 page project proposal and Timeline on Jan. 26.



### **Final Project:**

It is the responsibility of each group to purchase the materials for their final project. You are not allowed to spend more than **\$25.00** per student in your final project. Consider your final project as a low cost proof-of-concept, and not the final product.

1. This must be done in groups of three students. It is your responsibility to choose your partners.
2. Your group will meet as often as necessary to decide on the project that you would like to work on, and to work on it from its conception until it is finished.
3. Your grade in the project will be determined by your individual contribution and presentation, the creativity/novelty/quality of your project, your project web site and final report.
4. A 1 – 2 page proposal of your Final Project is **due Jan. 26**



### **Final Project (Continued):**

5. There are sample final projects on the Mechatronics Lab web page:  
[http://www.me.gatech.edu/mechatronics\\_lab](http://www.me.gatech.edu/mechatronics_lab)

6. The final project presentation will be on April 24 @ 1:30 pm

- The presentation schedule will be made available about one week before the presentation date.
- You are required to hand in your final report prior to your presentation.
- **Each group must develop a web page for their final project.**





## **Interim Report Requirements:**

1. Interim Reports should demonstrate the progress made since the last report/demonstration and provide a means for the students and instructor to assess the status of the Final Project. Refer to the timeline submitted with the project proposal when discussing your progress.
2. The report should cover the following topics (1-2 pages):
  - A recap of your project goals and objectives
  - A critical assessment of the progress your group has made
  - Major accomplishments since the last report/presentation
  - Difficulties and hardships encountered
  - Next steps to be taken by your group



**Notes:**

1. This schedule is subject to change at the discretion of the instructor.
2. You are responsible for materials covered during your absence.  
**There are no make-up lectures or tests.** You will get zero for any test you missed, unless you made a prior arrangement with me and took it earlier.
3. You must always clean up before you leave the Lab.
4. **Reviews of a test grade must be done within one week after the test is returned.**
5. Regular attendance is required in this class.
6. **No make-up projects or assignments will be given for grade enhancement.**



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# Grading Forms

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## ME 6408: Advanced Mechatronics Final Project Evaluation Worksheet

Project Title: \_\_\_\_\_

HCS12 Subsystems (Each Group Must Use at Least Four)

Analog to Digital Converter		Serial Peripheral Interface	
Main Timer		On-Chip EEPROM	
Pulse Accumulator		Pulse Width Modulation	
Parallel Input/Output		Maskable/Nonmaskable Interrupts	
Serial Communication Interface			

Group Member's Name

Comments on his/her Efforts

1. \_\_\_\_\_ -- \_\_\_\_\_  
\_\_\_\_\_  
% Individual Effort \_\_\_\_\_

2. \_\_\_\_\_ -- \_\_\_\_\_  
\_\_\_\_\_  
% Individual Effort \_\_\_\_\_

3. \_\_\_\_\_ -- \_\_\_\_\_  
\_\_\_\_\_  
% Individual Effort \_\_\_\_\_

4. \_\_\_\_\_ -- \_\_\_\_\_  
\_\_\_\_\_  
% Individual Effort \_\_\_\_\_

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**Other Measures of Success:**

Category	Superb	Good	Average	Fair	Poor
Usefulness					
Uniqueness/Creativity					
Construction Quality					
Control Implementation					
Aesthetics					
Demonstration					
Knowledge Gained					
Presentation					
Project Report					
Website					

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Total Score (3): \_\_\_\_\_ Grader: \_\_\_\_\_ Date: \_\_\_\_\_

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