25.107 Introduction to Engineering for ECE

Fall 2014

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OH Thursday 1630-1800 and Tuesday After Class 10:30-11:30

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Official Course Web Site

- http://faculty.uml.edu/jweitzen
- Please check the website week for announcements, course materials etc.
- All materials will be distributed via the Web site.
Overview

• What are we going to cover?
• How will you be graded?
• Why should you take this course?
• How to get the most out of this class?
• Introduction to Good Programming!
What are we going to cover?

• Application Programming in Matlab (7 weeks)
  – Learn Basic Programming Skills
  – See Examples of Digital Signal Processing
  – Help Strengthen your math and problem solving skills
  – Learn Basics of Analysis of Data

• ECE Lab in a Box (6 weeks)
  – Learn Analog Devices “Lab in a Box” digital oscilloscope and function generator
  – Write Simple Programs on a C micro-controller to make lights blink, control servos, read sensors, make sounds
  – Play with basic electronic components, learn to breadboard
  – Learn design through open ended design projects
Grading Policy

- 4 Regular Matlab Exercises 24%
- 2 Special Matlab Exercises 30%
- 6 ECE Hdw/Sw Labs 36%
- Attendance 10%
  - Attendance at 7 Lectures is required. (Lab Attendance will be factored into the final grade)
  - Late Lab Reports are 20% loss per week late starting at the end of lab 1 week after assignment
  - All Labs must be completed and submitted for grade of A or A-
  - Be aware: We are going to be very picky about good programming techniques, and things like axis titles and descriptions, comments, variable naming, block indenting, etc.
My Course Expectations!!!

• Have Fun!
  – If what we do in this class is not fun for you, consider whether this is the right major.

• COME TO LAB PREPARED
  – Attend or watch Lab Lectures
  – Read Lab Exercises and materials in Advance
  – Stay Caught UP, it is your responsibility

• Do your Best
  – Get Help if you Need it

• What you hand in should look professional
ORDERING YOUR OWN Lab In The Box

• You need to order your own Lab-In-A-Box kit
  – URL is on website
  – You need it by 3/1/2015: Don’t Wait Order Now!
  – Software Available Free on the Website

• Contents of Lab in a Box:
  – Analog Devices Discovery Module
    • Oscilloscope
    • Function Generator
    • Logic Analyzer
    • Volt Meter
  – Arduino Uno 32 Microcontroller
  – Wire Kit
  – Proto Board

• Parts kit (given out on first day of Hardware Labs)
Your UML ECE “Lab In a Box”

Digilent/Analog Devices Discovery Kit:
• 2 Channel Digital Oscilloscope
• Waveform Generator
• Logic Analyzer
• Volt meter

Course Parts Kit and Wire Kit

Arduino Micro Controller
Textbook and References

Matlab Textbook is free on Website to save you money

Optional Text available in bookstore

Reference For Microcontroller: See Website

Other References:
Lecture Notes, Online Help
Why this course

• Matlab is used in many upcoming courses.
• This course builds your analytical and problem solving skills in preparation for circuits, signal processing, communications, and control disciplines.
• Give you a first C programming experience in advance of 16.216
• Learn to use a digital oscilloscope, function generator
• Learn basic Electronic Components such as resistors, capacitors and basic assembly and test techniques
• Understand interfacing software and hardware based systems
Getting Help

• See your TA in Lab or in office hours
• Come see me in office hours
• Make an appointment with me
  – (I really don’t bite and am here to help you 😊)
• Send an e-mail to me
• Talk to your peers, but be careful, they may be even more lost than you are!
How to get the most out of this class!

• Come to the lectures or watch them on video. I will give you useful hints for solving the week’s problem
  – Download the notes and annotate them
• Please be prepared for lab by reviewing the lab and lecture notes before coming to lab.
  – Ask questions, that is why your TA’s are there
• Read the Reference Materials for each week’s labs
• Check the Course Website each week for hints and important updates.
  – If Classes are cancelled go to the website for instructions.
• Come and see me if you have questions, are stuck, or just want to talk.
  – If you have spent 2 hours in lab and 2 more hours stuck, please stop and come see me.
Course Logistics

• One hour of lecture on Tuesday and two hours of lab each week are for ECE
  – Each Week there will be assigned readings

• ALL LABS meet in Ball 420
  – Lab attendance is required and counts towards your grade.
  – At your scheduled time, you get priority on a seat: You are welcome at other times as space permits.

• If you want an A or A- you need to complete and submit all lab exercises

• To purchase student edition of Matlab go to (www.mathworks.com)
Assignment for Lab This Week

• Go to Laboratory: Ball 420
• Download and read Lecture Notes 0 and 1
• Do Exercise 0 and submit to your TA. Answers included
Professor Jay Weitzen (that’s me)

• EDUCATIONAL & PROFESSIONAL EXPERIENCE:
  – Education:
    • Ph.D. University of Wisconsin, Madison, 1983
    • MSEE University of Wisconsin, Madison, 1979
    • BSEE University of Wisconsin, Madison, 1978
  – Professional Experience:
    • More than 30 Years of Industrial and Academic experience in wireless networks, radio propagation, wireless network design. 2 US patents, and approximately 100 publications in the open literature in areas of modern wireless systems.
  – Current Research Interests:
    • Performance of large wireless 3G and 4G networks, small cell networks, high speed wireless data networks, network planning, wireless position location and applications, radio propagation
How to write a program

• Start with the requirements. What is the program supposed to do?
  – No point running fast if you do not know where you are going
• What are the external interfaces (inputs and outputs)
• What is the algorithm, describe it in pseudo-code or English
• Turn the algorithm into real code e.g. Matlab
  – Don’t forget to add comments, and good naming conventions
• Test, validate, and debug.
  – Spend less time here, more at beginning
Some Comments on good Programming!

• Stream of consciousness programming usually gets you in trouble
  – Understand clearly what you want to do before you start to program, and it will usually work

• Programming can be addicting like a video game
  – If you are stuck, do not keep doing the same thing over and over again (you will get same results)
    • Step back and understand what you are trying to do
    • Single step your program with the real time debugger
    • Test all Code paths including error handling
End of Notes 0: Good Luck