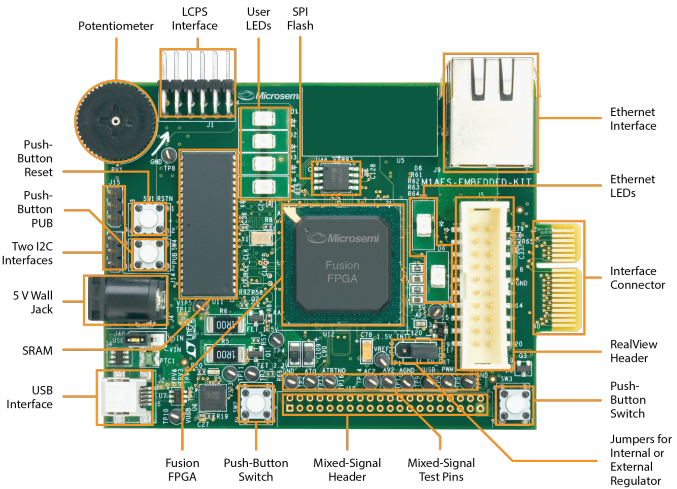

WHAT IS BME6163?

Kizito NKURIKIYEYEZU, Ph.D.

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What you will learn?

I designed this course to teach you the theoretical and hands-on skills necessary to design real world embedded systems. By the end of this course, you will have developed your own embedded system from scratch, both hardware and software. Since we do not have a lab (yet!) we will unfortunately only use simulations

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What is this course about?

The course forms advanced skills in embedded systems design. Those skills are usable in designing digital control units for consumer electronics, industrial automation, telecommunication systems and others.

What BME6163 is NOT?

This is an advanced graduate course; thus:

- You are expected to have the necessary background. The important topic will be revised very quickly but it is your responsibility to catch up.
- Time commitment—Expect to spend more time self-learning
- Professionalism—No babysitting! You are adults and I will treat you as such
- Course content —The course involves much more reading, deeper analysis, self-studies and research than undergraduate classes
- Evaluation —The quality of your work is expected to reflect a graduate level-course.

What you will learn

- This course will make engineers out of you
- Team-based embedded-system design: design, document and implement embedded systems that solve a realistic biomedical system that include multiple realistic constraints.
- How to be an engineer:
  - Use your creativity creativity, resourcefulness and persistence to solve complex problem
  - Extract information from obscure sources. You will read prodigiously. Your Labs will not have step-by-step instructions. This is typical for real design work.
  - This course will be hard. Some labs will take you more than 30 hours to complete. And you will, like any engineer, expected to produce high quality documentation (e.g., circuit design and specification circuit diagrams, PCB, documented C ode)
  - Read and understand long datasheets
  - Apply material from courses you have already taken
  - Ability to communicate your work succinctly and precisely

PREREQUISITES

- I assume you understand the basic of digital circuitry, computer architecture and organization, ability to read and understand electronic schematics, competency in at least one high level programming language, hex and binary numbers, etc..
- You have the ability to read and understand unfamiliar topics
- You don't have to be an expert. But I don't expect you to ask me what's "flip-flop"? or what's "a bus"?

Ideal expected knowledge

- **Computer architecture** —CPU Registers, memory addressing, data paths
- Electronics —Ohm laws, capacitor, diodes, resistors, transistors, op-amps, IC interfacing, analog filter design
- Good command of C (especially pointers in C)
- Fundamentals of data structures and algorithms

EVALUATION STANDARDS

- There will be regular online quizzes over any material taught in the class to date. The quizzes should be easy if you learn the material as you go and to make sure you do not fall behind.
- Exams —UR's policy will be applied
- Homework
  - Homework questions will be geared to test your theoretical understanding of lecture material.
  - Collaboration on homework is encouraged, but the work should be your own.
- Programming assignments
  - There will be several programming assignments
  - Each assignment expects design and debug some hardware simulation
  - ADVICE: Please try to work on this assignment early and ask questions if needed.

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NOTE If you do not understand homework questions or if you do not complete your programming projects, odds are you will fail the exams and ultimately fail this class. Please make sure you understand what's on the homework and solve yourself the programming assignments. (and not memorizing them! It won't help.)

ADVICE —Start working early

- Do the suggested exercises and make sure you write some code along the way. Review the course website and materials you received on the first day.
- Read the assigned materials for the first day (and subsequent days) ahead of time. It is especially easy for students who have had an earlier programming course to decide that they know this material and that they do not need to study it again.
- We will be moving at a much fast pace. I will expect that you understand more deeply the concepts I teach in this course.

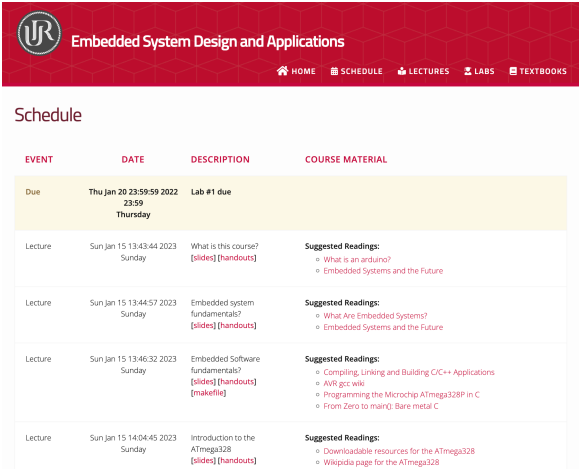
ADVICE —You are accountable

- Ask questions: I might not know if a particular student is struggling with the course unless he/she tells me so. Because of the nature of online courses, I will not slow down to accommodate the lagging student since I may not notice that you are lagging.
- You must not suppose that there is a safety net under you, which prevents you from failing. It will be your own hard work and commitment, and only that, which will keep you aloft.
- This course do not expect you to memorize definitions to repeat on an exam, or use your multiple guessing skills to do well on a test. Exams in this course expect that you will exercise your problem solving skills.

Course website

The course has two websites where I host all the materials

- The UR e-learning platform
  - This is the official website. When in doubt, consult this first
  - Everyone must register here
  - All quizzes will be conducted on this platform
  - https://elearning.ur.ac.rw/
- Personal website
  - https://qiriro.com/bme6163/
  - It should be used as a backup because the official web platform is often inaccessible —especially at peak time



The End