EAS 199B: Midterm Study Guide

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February 3, 2011

The following study guide has two main sections. The first section focuses on the class objectives and is organized topically. Each topic has the main objectives stated. Additional information on each topic is available on the class website. Keep in mind that even though all the objectives are fair game as far as the exam goes, due to time constraints, not all of them will appear on the exam.

The second section of the study guide is my advise on how to study for the exam. If I fail to cover all the class objectives in my advise, I apologize, but you are still responsible for knowing and understanding all the class objectives.

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*The following study guide was developed by the TA for this class. The TA can not be held responsible for any discrepancy between the study guide and the exam as the TA did not write said exam. That said, its still a pretty good study guide.

1 Class Objectives

1.1 Global View

1. Understand the broad goals of the fish tank project (big picture)
How do the things you have done in class complement the objectives of the project.

1.2 Story Problems

Look over quiz, homework and class notes.

1.2.1 Calibration of the Salinity Sensor

1. Understand the calibration curve for the conductivity sensor, (how and when to use it)

2. Be able to describe how salinity sensor works using vocabulary developed in class

1.2.2 Saltwater Chemistry

1. Be able to describe the role of ions in enhancing the electrical conductivity of salt water

2. Be able to calculate the weight percent of a salt water mixture given the mass of water and mass of salt

3. Be able to specify the mass of salt that is needed to be added to a volume of water to obtain a specified weight percent of salt

4. Be able to compute the number of H_2 molecules liberated per minute when a known current is passed through the conductivity sensor

1.2.3 Material Balances

1. Be able to perform a material balance on a control volume with inflow and outflow

2. Understand the differences between the two different types of mass balances you learned in class. Hint: Batch and Continuous.

1.3 Arduino Programing

In addition to needing to remember past Arduino programing points you will be responsible for the following new material...

1.3.1 "if" Constructs In Arduino Code

1. Be able to write Arduino programs that use "if" constructs to make decisions based on data from the environment. For example...

   a) `if {...}`

   b) `if {...}`
   `    else {...}`

   c) `if {...}`
   `    else {...}`
   `      if{...}`

2. Know and understand the following symbols

   `==`

   `>=`

   `<=`

   `<`

   `>`

1.3.2 LCD Panel Wiring and Programing

1. Be able to write a simple Arduino program to display messages onto the LCD panel

1.4 Electronics

Go over what you learned about circuits... but keep in mind what you learned this quarter.

1.4.1 Transistors

1. Be able to describe how transistors will be used with relays and solenoids

2. Be able to blink an LED using a transistor controlled by a digital I/O pin from an Arduino

3. Be able to blink an LED using a relay controlled by a transistor controlled by a digital I/O pin from an Arduino

1.4.2 Cascaded Switching

1. Be able to build a circuit that uses a transistor to control a relay

2. Be able to write an Arduino program that uses a transistor to control a relay

3. Be able to build a circuit that uses a transistor to control a relay that controls a solenoid

4. Be able to write an Arduino program that uses a transistor to control a relay that controls a solenoid

5. Understand Cascade switching principles

2 Additional Study Tips

1. Do not wait till the last minute to study. Do a little every day.

2. Form a study group and go over this stuff. If you don't understand it, maybe someone else will. You could also contribute. We all have strengths.

3. Go over your Quiz #1.
   If you got a problem wrong, do it again and make sure you understand the correct way of doing it.

4. Go over your homework.
   If you got a problem wrong, do it again and make sure you understand the correct way of doing it. If you don't understand why you got points off, and i did a bad job of explaining it in the comments, you should come ask me.

5. Find and do some practice problems. If you can't find any come talk to me and I can come up with some.[1]

6. **UNITS**

7. Think about any time you may have heard your professor say, "This would be a good question on an exam/quiz." I bet you it will be.

8. If you don't understand the syntax of a piece of code, figure it out, google, or come ask.

9. Read over any notes you may have written down.

10. If you feel uncomfortable with a problem, either on the homework, in class notes, or on the quiz, do it again, step by step.

11. Read your solution. Ask if the number makes sense. Ask if the Units make sense.

12. If you have questions, stop by and ask.

13. Something my AP Calculus teacher told the class before the AP exam: "It's not a measure of your worth, it's only a test."

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[1]A good way to come up with your own practice problem is to use an existing problem, change the numbers, and then change the solution to a given and switch one of the givens to a find. i.e. Problem on homework: $A + B = C$; Practice problem: $C' - B' = A'$. If you still need help, come ask me.