BE 4989 Advanced Experimental Methods for Engineers
Fall 2015

Credit hours: 3 (3 hours lecture)

Location and Time: 115 E.B. Doran Bldg.; 9:30 -10:20 am MWF

Description: Prerequisite: BE 2350 or equivalent. Current enrollment in BE 4290 and approval by instructor. Design principles for measurement/control instrumentation pertaining to biological engineering applications; examples in experimental design methods for testing instrumentation prototypes

Objectives: To understand basic instrumentation design involving sensor, power supply, controller and DAQ selection. Hands-on work will include designing and fabricating electronic measurement setups for biological measurement applications; and will include an introduction to circuit schematic creation and background literature organizing tools.

Instructor: Ms. Anna Dugas, M.S.B.A.E,
Rm. 105 E.B. Doran Bldg,
Phone # 225-578-1083,
E-mail: acharron@lsu.edu;
Office hours: by appointment


Criteria for Determining Grade:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance</td>
<td>5%</td>
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<tr>
<td>Homework/Quizzes</td>
<td>15%</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
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<tr>
<td>Project</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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The final course grade will be determined from the following scale:

A+ = 100 ≥ 96%, A = 96 ≥ 92%, A- = 92 ≥ 90%
B+ = 90 ≥ 86%, B = 86 ≥ 82%, B- = 82 ≥ 80%
C+ = 80 ≥ 76%, C = 76 ≥ 72%, C- = 72 ≥ 70%
D+ = 70 ≥ 66%, C = 66 ≥ 62%, C- = 62 ≥ 60%
F = less than 60%

Course Policies, Regulations and Procedures:

Attendance and participation is required. The Instructor is not responsible for makeup work or informing students of makeup work.

Exams will typically be divided into open book and closed book sections.
Examinations missed due to an unexcused absence cannot be made up and a grade of zero will be given for each one missed.

Any students requiring special arrangements for taking exams, taking-notes and other special arrangements please see or contact the instructor within the first two weeks of class.

Please make an appointment by e-mail for in-person consultations. If we make an appointment and you cannot attend, please call and cancel as soon as you can. Email is the best way to contact me.

**Web Page/ Supplemental Course Material**

A course web page will be made available through Moodle to enhance the course contents. Students are requested to visit this web site on a regular basis. The course webpage contains the course syllabus, the lecture schedule, lecture handouts, and review materials.

**Project Report Format**

For your project, you will be tasked to design an instrument (from Senior Design) and propose your testing methods for the efficacy of the instrument. A 5-10 page midterm progress report and an 8-10 page final project report will be generated. Expected formatting examples and tips will available on the course Moodle page.

**Academic Integrity and Academic Misconduct**

Students are expected to comply with the Code of Student Conduct at all times throughout this course. For your information, the Code of Student Conduct can be found at: [http://appl015.lsu.edu/slas/dos.nsf/$Content/Code+of+Conduct?OpenDocument](http://appl015.lsu.edu/slas/dos.nsf/$Content/Code+of+Conduct?OpenDocument)

**See attached schedule of classes (subject to change)**

<table>
<thead>
<tr>
<th>Day of</th>
<th>Topic</th>
<th>Assignment or Reading</th>
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<tbody>
<tr>
<td>24-Aug</td>
<td>Introduction to course</td>
<td>Business letter update on project</td>
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<tr>
<td>26-Aug</td>
<td>Background research, Emily Frank, LSU library</td>
<td>Read chapter 7</td>
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<tr>
<td>28-Aug</td>
<td>Safety, Electronic Lab Equipment</td>
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<tr>
<td>31-Aug</td>
<td>Power supply (AC)</td>
<td>Read Chapters 2.3, 3.2, 11, Apdx A</td>
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<tr>
<td>02-Sep</td>
<td>Power supply (DC)</td>
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<tr>
<td>04-Sep</td>
<td>Solar Power Design</td>
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<tr>
<td>07-Sep</td>
<td>LABOR DAY – no class</td>
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<tr>
<td>09-Sep</td>
<td>Small Group – Introduction to projects</td>
<td>Quiz on power supply / solar</td>
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<tr>
<td>11-Sep</td>
<td>Small Group – Introduction to projects</td>
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<tr>
<td>14-Sep</td>
<td>Sensors</td>
<td>Read Chapter 6</td>
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<tr>
<td>16-Sep</td>
<td>Sensors</td>
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<tr>
<td>18-Sep</td>
<td>Arduinos</td>
<td>Read Chapter 13</td>
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<tr>
<td>21-Sep</td>
<td>DAQs and Dataloggers</td>
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<td>23-Sep</td>
<td>PID and other controllers</td>
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<tr>
<td>25-Sep</td>
<td>Lab play day with Arduinos, DAQs</td>
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28-Sep  DC Motors  Read Chapter 14
30-Sep  AC Motors
02-Oct  Pumps

05-Oct  Actuators
07-Oct  Autodesk CFD
10-Oct  Autodesk CFD

12-Oct  Review for Midterm
14-Oct  Midterm
16-Oct  no class

19-Oct  Data Analysis – Experimental Planning  Supplement reading
21-Oct  Data Analysis – Experimental Planning
23-Oct  Data Analysis – Experimental Planning

26-Oct  Small Group – discussion on initial experimental plans
28-Oct  Small Group – discussion on initial experimental plans
31-Oct  FALL BREAK – no class

02-Nov  Human Factors Engineering
04-Nov  Building circuits / Drawing schematics  Chapter 7.2
06-Nov  Fabrication techniques

09-Nov  Small group – individual meetings
11-Nov  Small group – individual meetings
13-Nov  Small group – individual meetings

16-Nov  Open Book Exam Assigned
18-Nov  Project work day
20-Nov  Project work day

23-Nov  Project work day
25-Nov  Prep for BE 4290 presentations, or proposals
27-Nov  THANKSGIVING - no class

30-Nov  Prep for BE 4290 presentations, or proposals
02-Dec  Non-BE 4290 student presentations
04-Dec  Follow-up from BE 4290 presentations

11-Dec  Final Open Book Exam and Report Due by 9:30am (Friday)