<table>
<thead>
<tr>
<th>week</th>
<th>date</th>
<th>lecture topics</th>
<th>Reference</th>
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<tbody>
<tr>
<td>1</td>
<td>1/21</td>
<td>Introduction</td>
<td></td>
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<tr>
<td></td>
<td>1/23</td>
<td>medical instrumentation, biocompatibility, biomaterials</td>
<td>I-Ch. 1</td>
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<td>2</td>
<td>1/26</td>
<td>electrical safety: current levels for various electrical hazards</td>
<td>I-Ch. 14</td>
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<td></td>
<td>1/28</td>
<td>fuse, circuit breaker, ground fault circuit interrupt (GFCI)</td>
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<td>1/30</td>
<td>FDA regulations on medical devices</td>
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<tr>
<td>3</td>
<td>2/2</td>
<td>CITI training, IRB, IDE, 510k, PMA</td>
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<td></td>
<td>2/4</td>
<td>Engineering standards, IEC 60601 Medical electrical equipment</td>
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<td>2/6</td>
<td>AAMI EC11 and other standard examples, CITI certificate due</td>
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<td>4</td>
<td>2/9</td>
<td>review of electrocardiogram (ECG) and ECG amplifier</td>
<td>I-Ch. 3</td>
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<td></td>
<td>2/11</td>
<td>amplifiers for biopotentials, impedance matching</td>
<td>I-Ch. 6</td>
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<td></td>
<td>2/13</td>
<td>noninvasive measurement of arterial oxygen saturation</td>
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<td>5</td>
<td>2/16</td>
<td>(no class) President’s Day</td>
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<td>2/18</td>
<td>pulse oximetry, photoplethysmogram circuit</td>
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<td>2/20</td>
<td>Exam #1</td>
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<td>6</td>
<td>2/23</td>
<td>performance evaluation of QRS detection</td>
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<td>2/25</td>
<td>receiver operating characteristic (ROC) analysis</td>
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<td>2/27</td>
<td>false positive and false negative, sensitivity and specificity</td>
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<td>7</td>
<td>3/2</td>
<td>cardiac pacemakers, biventricular pacing, cardioverter defibrillator</td>
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<td>3/4</td>
<td>left ventricular assist device (LVAD), artificial heart</td>
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<tr>
<td></td>
<td>3/6</td>
<td>introduction to biomaterials and tissue engineering</td>
<td>II-Ch. 1</td>
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<tr>
<td>8</td>
<td>3/9</td>
<td>autograft, isograft, allograft, and xenograft; biocompatibility</td>
<td>handout</td>
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<tr>
<td></td>
<td>3/11</td>
<td>metals, ceramics, and polymers; sterilization techniques and effects</td>
<td>II-Ch. 1</td>
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<td></td>
<td>3/13</td>
<td>examples of biomaterial failures and recalls of medical devices</td>
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<td>9</td>
<td>3/16</td>
<td>no class this week (spring recess)</td>
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<td>10</td>
<td>3/23</td>
<td>biochips for point-of-care diagnostics</td>
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<td></td>
<td>3/25</td>
<td>neuronal action potentials and ionic currents</td>
<td>handout</td>
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<td>3/27</td>
<td>Exam #2</td>
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<tr>
<td>11</td>
<td>3/30</td>
<td>(NEU503) voltage clamp, current clamp, dynamic clamp, &amp; patch clamp</td>
<td>handout</td>
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<tr>
<td></td>
<td>4/1</td>
<td>(NEU503) the Universal Clamp project</td>
<td>II-Ch. 3</td>
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<td>4/3</td>
<td>protein-surface interactions</td>
<td>II-Ch. 3</td>
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<tr>
<td>12</td>
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<td>adsorption and desorption; the Vronman effect</td>
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<td>4/8</td>
<td>bio-nanotechnology</td>
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<td>4/10</td>
<td>carbon nanotubes, chirality, and biomedical applications</td>
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<td>13</td>
<td>4/13</td>
<td>DNA sequencing</td>
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<td>microarray technologies</td>
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<td>(no class) attending the Northeast Bioengineering Conference</td>
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<td>14</td>
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<td>microfluidic systems, polydimethylsiloxane (PDMS) devices</td>
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<tr>
<td></td>
<td>4/22</td>
<td>instrumentation: light, confocal, electronic, atomic force microscopes</td>
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<tr>
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<td>4/24</td>
<td>instrumentation: mass spectrometer, NMR</td>
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<tr>
<td>15</td>
<td>4/27</td>
<td>instrumentation: x-ray diffractometer</td>
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<tr>
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<td>4/29</td>
<td>conclusions</td>
<td>handout</td>
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<tr>
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<td>M 9:00 am - 10:30 pm Exam #3</td>
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</table>

**Grading:** Exam #1 (24%), Exam #2 (24%), Exam #3 (24%), CITI (4%), Report (24%).

BME 462 / ELE 562 Biomedical Instrumentation Design

Specific Program Outcomes

A: an ability to apply knowledge of mathematics, science, and engineering
B: an ability to design and conduct experiments, as well as to analyze and interpret data
D: an ability to function on multi-disciplinary teams
F*: an understanding of professional and ethical responsibility (* to be evaluated)
J: a knowledge of contemporary issues
K: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Final Report

Each student will write a final report on a specific biomedical device and/or biomedical technology of his/her own choice. The format of the report is as follows:

- Cover page – title, your name, affiliation, course number, professor’s name, date
- Table of contents – sections, page number
- Abstract – about 200 words
- Introduction
- (Description & analysis) – using appropriate sections
- Discussion – including a section on “Professional and Ethical Responsibility”
- References

Graduate students taking ELE 562 are expected to write a more in-depth, insightful report.

Students with Disabilities

Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. As part of this process, please be in touch with Disability Services for Students Office in Memorial Union, room 330 or phone 874-2098.