

**Course Profile: Biomedical Engineering Program**

<b>COURSE #:</b> BIOMEDE 241	<b>COURSE TITLE:</b> BIOMEDICAL ENGINEERING UNDERGRADUATE LAB
<b>TERMS OFFERED:</b> Fall and Winter	<b>PREREQUISITES:</b> BiomedE 211, 221, 231
<b>TEXTBOOKS/REQUIRED MATERIAL:</b>	<b>COGNIZANT FACULTY:</b> R. Schmedlen
<b>INSTRUCTOR(S):</b> R. Schmedlen	<b>DATE OF PREPARATION:</b> Winter 2008
<b>CATALOG DESCRIPTION:</b> This course provides an introduction to experimentation in circuits, systems, physical chemistry, thermodynamics, and mechanics with emphasis on biological applications. Lectures and laboratories on lab safety, measurement and analysis of physiological systems; operational amplifiers; rate of reaction; heat of reaction; whole body, tissue, and cellular mechanics; probability and statistical analysis.	<b>SCIENCE/DESIGN:</b> 4/0
	<b>COURSE TOPICS:</b> <ol style="list-style-type: none"> <li>1. Circuit analysis</li> <li>2. Operational amplifiers</li> <li>3. Mechanical testing of synthetic materials and biological tissues</li> <li>4. Whole body mechanics</li> <li>5. Cellular mechanics</li> <li>6. Systems physiology</li> <li>7. Heat of reaction</li> <li>8. Probability and statistics</li> </ol>

<b>COURSE OBJECTIVES</b>	<ol style="list-style-type: none"> <li>1. To teach students how to use a function generator, pre-amplifier, and oscilloscope for circuit analysis.</li> <li>2. To teach students how to build basic circuits and characterize the function of commonly used circuit elements.</li> <li>3. To teach students how to use a materials testing system, prepare material and tissue samples, and characterize their mechanical properties.</li> <li>4. To teach students how to analyze and compare mechanical factors that influence biological function on the cellular, tissue, and whole body scale.</li> <li>5. To teach students how to develop a hypothesis, design an experiment testing the hypothesis, and draw conclusions based on the results.</li> <li>6. To teach students how to process experimental data for quantitative analysis.</li> <li>7. To enhance students' communication skills through formal reports and poster presentations.</li> </ol>
<b>COURSE OUTCOMES</b>	<ol style="list-style-type: none"> <li>1. Characterize the function of capacitors, diodes, transformers, bridge rectifiers, voltage regulators and operational amplifiers.</li> <li>2. Measure the tensile and compressive properties of biological tissues.</li> <li>3. Investigate the muscle mechanics involved in everyday motion of the human body.</li> <li>4. Investigate the forces involved in cell-cell and cell-ECM adhesion.</li> <li>5. Characterize the heat of binding and rate of reaction for protein-protein binding.</li> <li>6. Learn statistical methods to analyze experimental data.</li> <li>7. Learn techniques for general laboratory safety, especially the use and disposal of biohazardous materials.</li> <li>8. Document laboratory experiences in both laboratory notebooks and formal laboratory reports.</li> </ol>
<b>ASSESSMENT TOOLS</b>	<ol style="list-style-type: none"> <li>1. In class quizzes.</li> <li>2. Individual homework sets.</li> <li>3. Individual laboratory notebooks.</li> <li>4. Individual pre-lab assignments.</li> <li>5. Individual and group laboratory reports.</li> <li>6. Written proposal of course project.</li> <li>7. Poster presentation on results of course project.</li> </ol>