BMEG 420 – Biomedical Instrumentation

Student Outcome a: An ability to apply knowledge of mathematics, science and engineering

Performance Criterion #1: *Students can describe the dynamic classification of biomedical instrumentation.*

Scoring Rubric:

Aspect	1: Not proficient	2: Progressing to proficiency	3: Proficient	4: Superior proficiency
Students can describe the dynamic features of biomedical instrumentation as zeroth-, first-, second- or high order systems	Students cannot describe the dynamic classification of biomedical instrumentation	Students can describe the dynamic classification of some biomedical instrumentation	Students can describe the dynamic classification of most biomedical instrumentation	Students can describe the dynamic classification of all biomedical instrumentation

Performance Criterion #2: *Students can derive mathematical models for biomedical instrumentation devices.*

Scoring Rubric:

Aspect	1: Not proficient	2: Progressing to proficiency	3: Proficient	4: Superior proficiency
Students can perform time- and frequency analyses of blood flow and pressure devices	Students cannot describe the mathematical models used for time- and frequency analysis of blood flow and pressure devices	Students can model the time- or frequency-response of blood flow and pressure devices with minor arithmetic errors	Students can find either time- or frequency-response of blood flow and pressure devices, but lack the ability to describe both	Students can describe both time- and frequency-response of blood flow and pressure devices, and plot the responses

Performance Criterion #3: *Students can apply digital signal processing techniques to biosignals.*

Scoring Rubric:

Aspect	1: Not proficient	2: Progressing to proficiency	3: Proficient	4: Superior proficiency
Students can design low-, high- and band-pass op-amp filters	Students cannot derive the transfer functions of low-, high- and band-pass op-amp filters	Students can derive the transfer functions of low-, high- and band-pass op-amp filters with minor arithmetic errors	Students can design low-, high- and band-pass op-amp filters, with unpractical electronic components	Students can design low-, high- and band-pass op-amp filters and deliver optimal engineering solutions

Student Outcome k: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Performance Criterion #1: *Students will utilize LTSpice for biomedical signal processing.*

Scoring Rubric:

Aspect	1: Not proficient	2: Progressing to proficiency	3: Proficient	4: Superior proficiency
Students can use MATLAB to design and perform analysis of op-amp filters for biomedical signal processing	Students cannot use LTSpice	Students can use LTSpice to plot the frequency-response of op-amp filters for biomedical signal processing	Students can use LTSpice to analyze op-amp filters for biomedical signal processing	Students can use LTSpice to design and analyze op-amp filters for biomedical signal processing

Performance Criterion #2: *Students can utilize SolidWorks software for biomedical instrumentation design.*

Scoring Rubric:

Aspect	1: Not proficient	2: Progressing to proficiency	3: Proficient	4: Superior proficiency
Students can use SolidWorks software for biomedical	Students cannot use SolidWorks	Students can use SolidWorks to design biomedical instrumentation.	Students can use SolidWorks to design and analyze biomedical instrumentation.	Students can use SolidWorks to design and analyze biomedical instrumentation.