EET-2410: BIOMEDICAL INSTRUMENTATION II

Cuyahoga Community College

Viewing: EET-2410 : Biomedical Instrumentation II

Board of Trustees:
May 2023

Academic Term:
Fall 2023

Subject Code
EET - Electrical/Electronic Engineer

Course Number:
2410

Title:
Biomedical Instrumentation II

Catalog Description:
Continuation of biomedical program. Study of general hospital equipment such as Safety Analyzers, Medtesters, IV Pumps, Defibrillators, Electrical Surgery Units, and Ventilators. Determine performance of equipment and verify that the equipment performs to specifications using simulators and analyzers. Equipment is evaluated using preventative maintenance procedures and operating procedures found in the equipment manuals.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
EET-2400 Biomedical Instrumentation I, and EET-2220 Electronics II or concurrent enrollment.

Outcomes

Course Outcome(s):
Use electronic test equipment like analyzers, oscilloscopes, and Digital Multimeters (DMMs) to test and/or troubleshoot Biomedical Test Equipment.

Objective(s):

a. Measure power supply voltages on Defibrillators and ESUs with DMMs.
b. Measure ESU voltage, current, and power. with ESU (Electro Surgery Unit) Analyzer.
c. Produce the characteristic waveform for cut or coag and then measure this waveform using an oscilloscope with ESU Analyzer.
d. Measure energy output from defibrillator with Defibrillator Analyzer.
e. Produce cardioversion waveform and use oscilloscope to measure cardioversion timing with Defibrillator Analyzer.
f. Measure flow rate, and volume for IV pumps with IV pump analyzer.
g. Measure flow rate, inhale and exhale times and inhale to exhale ratio with Ventilator analyzer.

Course Outcome(s):
Use Biomedical Equipment manuals to determine if the Biomedical Test Equipment is functioning properly.

Objective(s):

a. Determine if the ESU is delivering the proper power output under various load conditions and compare to the power graphs in the operating manual.
b. Determine if the ESU is delivering power at the frequency given in the operating manual.
c. Determine if the IV pump performs properly when performing the P/M procedure in the manual. This includes volume checking, Occlusion checks, and flow rates.
d. Determine if the Defibrillator meets accuracy specifications as illustrate in the manual.
e. Perform an SST (Short System Test) on a ventilator as illustrated in the manual.

Course Outcome(s):

Write a professional report on biomedical equipment operation and preventative maintenance checks.

Essential Learning Outcome Mapping:

Written Communication: Demonstrate effective written communication for an intended audience that follows genre/disciplinary conventions that reflect clarity, organization, and editing skills.

Objective(s):

a. Write a report which includes objectives, detailed lab results (including test data, pictures, and graphs) and conclusions.
b. Create and import graphs that relate to the biomedical project.

Methods of Evaluation:

a. Homework
b. Laboratory reports
c. Quizzes
d. Midterm examination
e. Final examination

Course Content Outline:

a. Patient simulators
    i. Pronk Technologies Sim Slim, Sim Cube
    ii. Dynatech Nevada 214, 215
b. Medtesters
    a. Dynatech Nevada 5000
    b. Fluke 5000
c. IV Pumps
    a. Baxter Floguard
    b. Abbot Plum A+
    c. Spectrum
    d. Flotrax Analyzer
    e. Principle of operation
    f. Occlusion checks
    g. Volume checks
d. Defibrillators
    a. Phillips Lifepak 9
    b. Heartstart
    c. Zoll M Series
    d. Defibrillator Analyzer
    e. Measure energy
    f. Measure power supplies
    g. Cardioversion
e. Electrical Surgery Units
    a. Force Fx
    b. Force F2
    c. Conmed
    d. Measure power supplies
    e. Examine frequency waveforms
    f. Measure power in cut and coag modes
f. Ventilators

a. Puritan Bennet 840
b. Flow analyzer
c. Perform SST test
d. Measure flow rate
e. Verify Inhale:Exhale ratio
f. Measure pressure

Resources

Joseph J. Carr, and John M. Brown. *Introduction to Biomedical Equipment Technology*. 4th ed. Merrill, 2000. 6/9/2000.

R.S Khandpur. *Handbook of Biomedical Instrumentation*. 3rd ed. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2014. 1/1/2014.

Barbara Christe. *Introduction to Biomedical Instrumentation: The Technology of Patient Care*. 2nd ed. New York, NY: Cambridge University Press, 2017. 12/27/2017.

Red-Hot Careers. (2018) (4/21/2018) *Certified Biomedical Equipment Technician RED-HOT Career*, Createspace Independent Publishing Platform.

Institute For Career Research. (2018) (4/21/2018) *Career as a Biomedical Equipment Technician*, Createspace Independent Publishing Platform.

William Owens. (2021) (4/9/2021) *The Ventilator Book*, FIRST Draught Press.

Top of page
Key: 1675