

BMT 212 BIOMEDICAL INSTRUMENTATION I

COURSE DESCRIPTION:

Prerequisite: BMT 211

Corequisite: none

This course covers theory of operation, circuit analysis, troubleshooting techniques, and medical applications for a variety of instruments and devices. Topics include electrodes, transducers, instrumentation amplifiers, electrocardiographs, monitors, recorders, defibrillators, ESU units, and related equipment used in clinical laboratories, intensive care units, and research facilities. Upon completion, students should be able to calibrate, troubleshoot, repair, and certify that instrumentation meets manufacturer's original specifications.

Course Hours per Week: Class, 3; Lab, 6

Semester Hours Credit: 6

LEARNING OUTCOMES:

Upon completion the student will be able to:

- a. Test and calibrate an electrosurgical unit
- b. Test an infusion pump for proper operation
- c. Identify common battery technologies and their charging requirements
- d. Test and calibrate a dialysis machine
- e. Read hydraulic and pneumatic circuit diagrams
- f. Test and calibrate a ventilator
- g. Identify network addresses and configure security
- h. Explain the use and operation of common imaging modalities: X-ray, PET, MRI and Ultrasound

OUTLINE OF INSTRUCTION:

- I) Electrosurgical Unit (ESU)
 - A) Purpose and operation
 - B) Calibrating Patient safety circuit (REM)
 - C) Measuring delivered power
 - D) Electrical circuit
- II) Infusion Pumps
 - A) Purpose and operation of infusion pumps
 - B) Patient safety
 - C) Delivery accuracy testing
- III) Batteries
 - A) Battery chemistry and safety
 - B) Measuring state of charge, capacity, and internal resistance
 - C) Battery charging
- IV) Dialysis Machine
 - A) Purpose and operation of a dialysis machine
 - B) Patient safety
 - C) Testing and calibrating sensors

- D) Electrical circuit

- V) Hydraulic and Pneumatic Circuits
 - A) Circuit diagrams
 - B) Build hydraulic and pneumatic circuit from schematic diagrams

- VI) Respiratory Therapy Equipment
 - A) Purpose and operation of a ventilator
 - B) Testing and calibrating a ventilator using a manometer
 - C) Testing and calibrating a BIPAP machine
 - D) Anesthesia Machine purpose and operation

- VII) Networking
 - A) Network addresses
 - B) Routing network traffic
 - C) Configuring wireless access points and security

- VIII) Imaging
 - A) Tomography
 - B) X-ray
 - C) PET
 - D) MRI
 - E) Ultrasound

REQUIRED TEXTBOOK AND MATERIALS:

Text to be assigned by the instructor each semester