

BMT 211 BIOMEDICAL MEASUREMENTS

COURSE DESCRIPTION:

Prerequisite: ELN 132

Corequisite: none

This course introduces the human-instrument system and problems encountered in attempting to obtain measurements from a living body. Topics include electrodes, transducers, instrumentation, amplifiers, electrocardiographs, monitors, recorders, defibrillators, ESU units, and related equipment. Upon completion, students should be able to analyze, troubleshoot, repair, and calibrate diagnostic and therapeutic equipment.

Course Hours per Week: Class, 2; Lab, 2

Semester Hours Credit: 3

LEARNING OUTCOMES:

Upon completion the student will be able to:

- a. Explain to causes of micro shock and macro shock
- b. Perform an electrical safety test on equipment
- c. Test SPO2 sensors for proper operation
- d. Test and calibrate NIBP units
- e. Test an ECG monitor and electrodes
- f. Test and calibrate a defibrillator
- g. Test and calibrate patient warmer
- h. Measure electrical noise to identify the source
- i. Explain the purpose of regulatory agencies
- j. Research equipment faults and recalls

OUTLINE OF INSTRUCTION:

- I) Electrical safety
 - A) Causes of micro shock and macro shock
 - B) Electrical activity of the heart
 - C) GFCI and isolated power systems
 - D) Electrical safety testing
- II) Pulse Oximeter (SPO2)
 - A) Purpose and operation of SPO2 sensor
 - B) Causes of measurement error
 - C) Testing SPO2 using a patient simulator
- III) Non-Invasive Blood Pressure
 - A) Purpose and operation of NIBP unit
 - B) Causes of measurement error
 - C) Test and calibrate NIBP unit using manometer
- IV) Electrocardiogram (ECG)
 - A) Heart electrical activity

- B) Purpose and operation of the ECG
 - C) Causes of measurement error
 - D) Test ECG monitor and electrodes using a patient simulator
- V) Defibrillator
- A) Purpose and operation of a defibrillator
 - B) Defibrillator safety
 - C) Measure defibrillator delivered energy
- VI) Temperature Measurements
- A) Thermocouples
 - B) RTDs
 - C) Testing Patient Warmers
- VII) Electrical Noise
- A) EMI and RFI Noise sources
 - B) Measuring noise
 - C) Identifying noise sources
- VIII) Agencies, Alerts, and Recalls
- A) Purpose of agencies: NFPA, TJC, AAMI, IEC, FDA
 - B) HIPAA privacy regulations
 - C) Using MEDSUN to research equipment alerts and recalls
 - D) Using technical websites such as MedWrench

REQUIRED TEXTBOOK AND MATERIALS:

Text to be assigned by the instructor each semester