

COURSE OUTLINE
BMET-211
Biomedical Instrumentation I
5 Credits

HOWARD COMMUNITY COLLEGE

Description

The student will be able to classify biomedical instruments into areas such as support, laboratory, diagnostic, patient monitoring, therapeutic, x-ray, etc. Biomedical transducers will be introduced, and students will make application of the terms of sensitivity, resolution, recordability, readability, linearity and accuracy in order to effect correct usage. Prerequisite: BIOL-106, BMET-112 and ELEC-117. Co-requisite: ELEC-213. (4 hours lecture, 3 hours lab)

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Identify various components of the hospital environment and the specific functions of each section as pertains to specific patient treatment.
2. Describe the specific instruments used in patient care.
3. List the capabilities and limitations of transducer devices used to transform the patient's vital signs into usable signals that are inputs into Biomedical Instrumentation.
4. Read and interpret manufacturer's service literature, schematics, and operator's manuals to ensure proper operation.
5. Use the proper simulators, standards and test equipment to ensure data for patient diagnosis is accurate.
6. Ensure that specific equipment is operated safely and evaluate safe usage by utilizing safety test equipment.
7. Determine various regulatory agencies and the role they perform as pertains to safe environmental and equipment operation.
8. Specify types of patient isolation as pertains to any biomedical instrumentation.
9. Analyze circuitry used to calculate outputs from various instrument inputs.
10. Define circuit stability, frequency responses, bandwidth, and slew rate in various types of instrumentation.
11. Calculate common mode rejection and analyze equipment for proper signal to noise ratios.
12. Determine the function of guard circuits when attempting to measure specific functions of the cardiac system.
13. Compare various types of recorders used in biomedical instrumentation.
14. Provide reports that are mandatory to comply with various regulatory organizations pertaining to safe operation of medical instrumentation.
15. Plan an organized troubleshooting technique using schematics, block diagrams and circuit descriptions.
16. Identify the hazards of operating certain biomedical instrumentation such as defibrillators or electro surgical units.

17. Differentiate or integrate various biopotential signals to determine output.
18. Measure various biopotential signals pertaining to the cardiovascular system and understand the origin of these potentials.
19. Discuss the ethics required of the technician when working in this environment.
20. Compare the interpersonal relationships encountered in the medical profession.

Major Topics

- I. General Instrumentation
 - A. Test Equipment Used to Measure or Duplicate Biopotential Outputs
- II. Bioelectric Potentials and the System Support that is Required
 - A. Basic Cell Potentials/The Circulatory System/The Heart
- III. Biomedical Instrumentation
 - A. EGG Recognition/Power Supplies/Transducers/Electrodes
 - B. Defibrillators
 - C. Blood Pressure Transducers
- IV. Regulatory Agencies and the Role Performed
 - A. JCAHO
 - B. NFPA
 - C. FDA
 - D. LICENSURE
 - E. AAMI
- V. Electrical Safety Pertaining to Safe Instrument Interfacing Involving the Patient and Staff
 - A. Regulatory Requirements
 - B. Legal Aspects of Patient Safety

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member(s) but will include the following:

- Final grades will be based on exams and lab requirements.
- This course includes a comprehensive final test.

Writing: Specific writing assignments will be determined by the individual faculty member.

Other Course Information

This course is a course in the Biomedical Engineering Technology Program.