



King Saud University
College of Applied Medical Sciences
Department of Biomedical Technology
BMT335 Mechanical Biomedical Equipments 3 (2-1-0)

Current Instructor: Dr. seddik Khemaissia
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Textbook(s) and/or Other Required Materials:

Course Description (catalog):

This course focuses on the theory of clinical laboratory instrumentation and the function, utilization, and problem-solving skills necessary for the support of laboratory equipment. It gives an overview of the types of biomedical mechanical instruments needed to support patients with life threatening problems such as ventilators, sterilization machines, hemodialysis and their service requirements units (water treatment and gas systems). The function of each type of equipment is discussed. Some pieces of equipment are examined thoroughly in relation to operation, application; circuit and block diagrams.

Prerequisites: BMT 232

Co-requisite: None

Course Type: Mandatory

Course Learning Outcomes: Upon completing BMT335, students should have the following capabilities:

1. Students are knowledgeable of the operation, application and components of biomedical mechanical instrumentations.
2. Gain knowledge of the hospital service requirements for these machines such as water treatment and gas system.

a. an ability to select and apply the knowledge, techniques, skills, and modern tools of biomedical technology to include the application of circuit analysis, analog and digital electronics, microcomputers, biomechanics, biomedical instrumentation systems, and safety in the building, testing, operation, and maintenance of biomedical equipment.

Covered

select and apply the knowledge, techniques, skills, and modern techniques of analog and digital circuits and microprocessor for testing and operations of mechanical biomedical instrumentation.

b. an ability to select and apply a knowledge of mathematics, chemistry, physics, and biological sciences, engineering, and technology to building, testing, operation, and maintenance of biomedical equipment and the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of biomedical systems.

c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.

Covered through practical session

d. an ability to analyze, design, and implement biomedical systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives.

e. an ability to function effectively as a member or leader on a technical team.

f. an ability to identify, analyze, and solve broadly-defined biomedical technology problems.

g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.

Covered through the contribution sessions given as preparation, presentations and discussion by students

h. an understanding of the need for and an ability to engage in self-directed continuing professional development.

i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.

Covered

j. a knowledge of the impact of engineering technology solutions in a societal and global context and an understanding of the clinical application of biomedical equipment.

k. a commitment to quality, timeliness, and continuous improvement.

Major Topics covered and schedule for every week:

1. Introduction to Mechanical Biomedical Equipments
2. Medical Gas Systems:
3. Oxygen – Nitrous Oxide
4. Medical Gas Systems: Compressed Air – Vacuum.
5. Water Treatment For Hemodialysis machines: Feed Water components – Pre-treatment components.
6. Water Treatment For Hemodialysis machines: Reverse Osmosis membrane - Post treatment components - Distribution system
7. Asepsis: Sterilization
8. Disinfection
9. Hemodialysis Systems: Dialyser – Extracorporeal Blood Circuit – Dialysate Fluid Circuit
10. Hemodialysis Systems: Dialysis Process – Session Phases
11. Hemodialysis Systems: URR, Kt/V & Treatment Time – Termination – Post-dialysis Evaluation
12. Ventilations and Ventilators: Ventilator Settings - Modes of Mechanical Ventilation
13. Ventilations and Ventilators: Functional Relationship of the operator, Patient, and the Ventilator
14. Operational Descriptions