King Saud University
College of Applied Medical Sciences
Biomedical Technology Department

BMT315: Introduction to Bioelectrical Instrumentation 2 (1-1-0)

Current Instructor: Mr. Mostafa Hamid Mohamed and Dr Ali S. AlMejrad
Course Coordinator: Dr Ali S. AlMejrad
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Textbook(s) and/or Other Required Materials: Biomedical Instrumentation and Measurements, L. Cromwell et. al, 2nd Edition, Prentice Hall.

Course Description (catalog): This course covers Introduction to biometrics, components of man-instrument system, problems encountered in measuring a living system, basic transducer principles, origin of bio-potentials, Introduction to ECG, EGG and EMG, bioelectric amplifiers and instrumentation amplifier, biopotential electrodes and finally the general structure of biomedical instrument using one application.

Prerequisites: BMT313
Co-requisite: BMT314
Course Type: Mandatory

Course Learning Outcomes: The global content of the course will achieve:
- Introducing the basics of biomedical measurements and man-instrument system.
- Understanding the origin of bio-potentials, genesis of different bio-potentials and their parameters. Bio-electrodes and bioelectric amplifiers and signal processing
- Understanding function of basic transducers.
- Understanding the structure of biomedical instrumentation systems
- Developing an ability to analyze biomedical instrument using acquired basics

Student Outcomes Covered by Course:
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

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.
Covered

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

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

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

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

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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.

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

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

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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.

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

Major Topics covered and schedule in weeks:

1- Introduction to biomedical instrumentation W1
2- Biometrics W2
3- Components of man-instrument system W3
4- Problems encountered in measuring living system W4
5- Basic transducer principles (active, passive) W5-7
6- Source of bioelectric potentials W8-9
7- Bio-amplifier W10
8- Electrodes (theory and applications) W11-12
9- Applications: the cardiovascular measurements W13-14