



**King Saud University**  
**College of Applied Medical Sciences**  
**Department of Biomedical Technology**  
**BMT413 Biomedical Electronics V 3 (2-1-0)**

**Current Instructor:** Mr. Emad Amin and Dr. Javeed Shaikh Mohammed

**Course Coordinator:** Dr. Javeed Shaikh Mohammed

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**Textbook(s) and/or Other Required Materials:** The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications by Walter A. Triebel and Avtar Singh (4<sup>th</sup> edition), 2003, Pearson Education

**Course Description (catalog):** This course covers: Review of digital principles; introduction to general processor based system with definitions to the different units and buses; organization and internal structure of the microprocessor; the operation of the microprocessor; Introduction to programming techniques: program development, program design and program running, DEBUG; Introduction to assembly programming: basic definitions, instruction definitions & categories, addressing modes; assembly programming: data transfer, arithmetic, logic, shift, and rotate instructions, flag control, compare, jump, subroutine, loop, string instructions; Memory Interfaces, memory: types, size and organization; Input/Output (I/O) interfaces, Input/Output (I/O) interface circuits and LSI devices; address decoding for memory and I/O; software applications; applications on the use of microprocessor in Biomedical Instrumentation with discussion of microprocessor based Biomedical Instrumentation faults

[http://faculty.ksu.edu.sa/javeed/BMT\\_413/Forms/AllItems.aspx](http://faculty.ksu.edu.sa/javeed/BMT_413/Forms/AllItems.aspx)

**Prerequisites:** BMT314

**Co-requisite:** None

**Course Type:** Mandatory

**Course Learning Outcomes:**

Upon completing BMT413, students should have the following capabilities:

- Knowledge of the construction and operation of Intel 8086 microprocessor.
- Knowledge of assembly programming of Intel 8086 microprocessor.
- Knowledge of designing interface circuits of memory and I/O devices with Intel 8086 microprocessor.
- Ability to write assembly language programs to conduct experiments using Intel 8086 microprocessor kits.
- Knowledge of applications of Intel 8086 microprocessors in biomedical instrumentation.

**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.

**Students select and apply the knowledge, techniques, and skills of Intel 8086 microprocessor to microprocessor related activities**

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.

[Students select and apply knowledge of mathematics, science, engineering, and technology to Intel 8086 microprocessor problems](#)

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

[Students conduct standard tests and measurements; conduct, analyze, and interpret experiments using Intel 8086 microprocessor kits](#)

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

[Students design interface circuits of memory and I/O devices with Intel 8086 microprocessor](#)

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.

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.

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.

[Students gain the knowledge of biomedical applications of Intel 8086 microprocessors](#)

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

**Major Topics covered and schedule in weeks:**

1. Overview: Introduction to the course, Review of digital principles
2. Introduction to Microprocessors
3. Organization and internal structure of the 8086
4. Operation of the 8086 microprocessor
6. Introduction to programming techniques
7. Introduction to assembly programming
8. Assembly programming I
9. Assembly programming II
11. Memory Interfaces
12. Memory, Input/Output (I/O) interfaces
13. Input/Output (I/O) interface circuits, Address decoding for memory and I/O
15. Biomedical applications of 8086