



**King Saud University**  
**College of Applied Medical Sciences**  
**Department of Biomedical Technology**

**BMT 485 Biomedical Computing 4 (3-1-0)**

**Current Instructor:** Eng. Emad Amin and Dr. Nabil A. Alrajeh

**Course Coordinator:** Dr. Nabil A. Alrajeh

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**Textbook(s) and/or Other Required Materials:** Primary: Edward H. Shortliffe, Leslie E. Perreault, (Eds.), *Medical Informatics: Computer Applications in Health Care and Biomedicine (3rd edition)*, Springer-Verlag, 2006

**Course Description (catalog):** Biomedical computing course provides students a conceptual framework for understanding medical informatics and applications of information technology in the healthcare environment. The course will include in-depth discussion of how to use of technology in health care systems with emphasis on leveraging technology to improve quality and efficiency in care delivery. Moreover, the course provides an overview of the most important aspects of medical informatics that will impact the clinical research, education, health management and clinical services.

**Prerequisites:** BMT413

**Co-requisite:** None;

**Course Type:** Mandatory

**Course Learning Outcomes:** Upon completing BMT485, students should have the following capabilities: Explain biomedical computing and its role in health, health care, public health, medical education and biomedical research; Compare and contrast the roles of various individuals in the health information technology workforce; Define the major challenges to health information technology adoption in health care organizations; Describe and compare the best practice approaches to systems acquisition and system design; Identity the essential functions of the electronic health record (EHR) and the barriers to its use; Identify the components of the personal health record (PHR) and describe its value; Explain the process of computerized provider order entry and challenges to its use; Differentiate the difference among privacy, confidentiality, and security and their role in the HIPAA regulations; Explain the importance of standards and interoperability of clinical data and the major initiatives underway to create and enable them; Describe the management of images in clinical settings, including the use of PACS systems; Classify the different types of telemedicine and their efficacy as shown in clinical studies; Explain how people and organizational issues impact the use of health information technology and criteria for selecting the proper hospital information systems; Explain the process of using Information technology in Patient monitoring to improve the health quality.

**Student Outcomes Covered by Course:**

- a- an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology 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.

This course is designed to introduce the fundamental principles of medical informatics. It is taught so that individuals with various backgrounds, including those with medical, computer science, or other backgrounds, can become familiar with information management and computer applications in health care. Students select and apply knowledge of mathematics, science, engineering, and technology to health information problems

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

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

Practical includes experiments, programming skills and small project. Students are asked to design and develop a database for any department at a hospital. For instance, databases for pharmacy, clinical labs, radiology, etc. The goal of these projects is for students to explore information systems at hospitals and to learn important practical issues related to hospital information system. In addition, students learn a programming language. Presentations should be related to course content.

- 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.

Most classes consist of didactic lecture. Interactivity from students is strongly encouraged. Students are required to present a topic about the new trends in hospital information systems and recent applications in healthcare organizations.

- 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.

Different applications on health informatics and their impact to the society are discussed during the course.

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

**Major Topics covered and schedule in weeks:** The following topics are covered:

Topics	Weeks	Contact Hrs
1. The computer meets the medicine: defining the discipline.	1	3
2. Medical data: their acquisition, storage, and use.	1	3
3. System design and engineering	1	3
4. Computer-based patient record system	2	6
5. Computer In Medical Education 1	1	3
6. Computer In Medical Education 2	1	3
7. Telemedicine	1	3
8. Imaging systems 1	1	3
9. Imaging systems 2	1	3
10. Patient-monitoring system	1	3
11. Standards in Health Informatics	1	3
12. Criteria for Selecting Health Information Systems	1	3
13. Future uses of Health Informatics and important Concepts	1	3

Assignments: Short exercises will be assigned topics in most weeks, to be handed in the following week. Students should do their own work. Assignments include brief presenting of the next week's topic. Participation is essential to understanding course material and success in the course.

Examinations: One midterm test and final exam.

Grading Grades are derived from four components:

Participation/assignments (5%), Presentations (15%), Midterm test (20%), Practical (20%), Final exam (40%)