

Faculty of Computers and Artificial Intelligence
Beni-Suef University

**Academic Reference Standards (ARS) for the Medical Informatics
Program**

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1. Introduction

Medical Informatics is an emerging field in the computing discipline that is concerned with designing, developing and adoption of medical informatics system as a distinctive field that lies in the intersection of computer science and medical systems.

The introduced Academic Reference Standards (ARS) are based on the National Academic Reference Standards (NARS) for computing that were suggested by the Computing and Informatics sector committee in the Supreme Council of Universities in Egypt. It is also based on the recommendations set by the joint international committee formed by ACM/IEEE.

2. Learning Objectives

The Medical Informatics program is designed to provide the students with the foundations of the discipline as well as the opportunity for specialization. After successfully completing the Medical Informatics program, the graduate should be able to:

- a. Developing the ability to recognize problems in medical information systems and knowledge of the tools necessary for solving such problems.
- b. Understands fundamentals of medical information systems, medical software projects management, medical information systems validation and verification and the adoption of software projects.
- c. Implement solutions using appropriate programming languages and design tools for medical informatics problems.
- d. Apply the principles of computer science to various kinds of medical software applications.
- e. Specify the requirements, design and implement medical informatics projects, and evaluate them in terms of their quality attributes.
- f. Apply software solutions to social, inter-organizational and managerial problems in medical systems.
- g. Describe characteristics of various pieces of medical informatics including modules, components, and patterns.
- h. Communicate effectively by oral, written and visual means.

- i. Work effectively as an individual and as a member of a team.
- j. Perform independent and efficient time management.
- k. Be aware of the key ethical issues affecting **medical informatics** and the responsibility of the software engineer as computing professional.

3. Graduate Attributes

Successfully completing this program will contribute to the following graduate attributes:

Graduate Attributes*	Learning Objectives										
	a	b	c	d	e	f	g	H	i	j	k
A1. A comprehensive knowledge of the field of the study	•	•				•	•				
A2. An understanding of relations to other disciplines	•	•		•			•				
A3. An international perspective on the field of study.	•	•		•		•	•				
B1. The ability to collect, analyze and organize information and ideas			•	•		•	•				
B2. The ability to interact effectively with others.			•		•			•			
B3. The ability to select and use the style and means of communications			•			•		•			
B4. The ability to engage effectively with information and communication skills			•		•		•	•		•	
C1. The ability to work and learn independently	•	•		•	•	•	•	•	•		
C2. The ability to generate ideas.			•		•	•			•		
C3. The ability to identify problems and create solutions	•		•	•			•			•	
D1. The ability to define and analyze problems	•			•	•						
D2. The ability to apply critical reasoning			•		•						
D3. The ability to evaluate opinions and make decision			•		•	•					

E1. An understanding of social and civic responsibility				•	•	•				•	•
E2. An appreciation of the philosophical and social contexts of a discipline			•			•					•
E3. A knowledge of ethical standards in relation to the field of study				•		•					•
E4. Knowledge of other cultural and cultural diversity						•		•			•

* The NARS attributes in the field of computing

4. Academic Reference Standards for Software Engineering Program

In addition to Knowledge and Understanding of computing and information graduate, the Information Technology graduate should be able to

4.1 Knowledge and Understanding

On successful completion of the program, graduates should be able to acquiring knowledge and understanding of:

- a. Concepts and theories of mathematics and medical science related to the field of medical informatics.
- b. Basics of networking and software solutions
- c. Principles of medical systems design including components, pattern, objects and entities design
- d. Methodologies for solving problems especially problems related to medical system design, analysis and developing
- e. Professional ethics and socio-economical impact of medical informatics production and engineering
- f. Current technologies and tools used for medical informatics development and engineering
- g. Medical software quality assurance, verifications and validation.
- h. Medical Software security, safety and environmental issues
- i. Medical software project management and its links and relation to the business systems.

- j. Advanced topics in medical informatics
- k. Professional ethics in information technology environment and human rights
- l. Impact of medical informatics in the global and societal context.

4.2 Intellectual Skills

On successful completion of the program, graduates should be able to:

- a. Model problems using mathematical models, programming methods and software engineering techniques.
- b. Create and/or design piece of medical software (module, component, design pattern and class) based on the principles of software design and engineering
- c. Have analytical thinking that enables him/her to select appropriate solutions for medical software design and developing problems
- d. Take into consideration the adoption, economical and risks aspects involved in the process of medical informatics engineering
- e. Assess and evaluate the performance of medical software systems
- f. Solve the problems encountered in the process of medical software design and production taking into consideration the limitations and the practical criteria and constraints of the computation capabilities
- g. Analyze the results of computational models besides the limitations of the computing capabilities.
- h. Maintain a systematic approach in dealing with advanced technologies in the field of medical informatics.
- i. Judge costs, benefits, quality, reliability and environmental impact of medical informatics systems production and adoption.
- j. Analyze medical systems, processes and components critically
- k. Select appropriate tools and technologies to a varieties of medical informatics problems

4.3 Practical and professional Skills

On successful completion of the program, graduates should be able to:

- a. Integrate knowledge of mathematics, medical science, IT, business context and informatics in order to solve problems in the area of software production and adoption.
- b. Collect, analyze and interpret medical data using software and hardware tools beside the ability to design intelligent medical tools.
- c. develop and improve medical software design, products and service.
- d. Solve medical software problems using data science modeling and programming techniques
- e. Implement comprehensive computing knowledge and intellectual skills in medical informatics projects
- f. Commercialize knowledge and skills to the medical software industry
- g. Apply principles of safety, reliability in developing medical software
- h. Prepare and present technical material
- i. Demonstrate medical software project management skills
- j. Appreciate the neatness and aesthetics in medical software design

4.4 General and Transferable Skills

On successful completion of the program, graduates should be able to:

- a. Work efficiently in a team = sw
- b. Work in stressful environment and within constraints
- c. communicate effectively
- d. Demonstrate efficient IT capabilities
- e. Lead and motivate individuals
- f. Manage tasks and resources
- g. self-learning and information gathering
- h. Acquire entrepreneurial skills
- i. Demonstrate critical thinking and problem solving skills.

