

MIMP: Introducing Postgraduate Education in Medical Informatics in Egypt

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Abstract

We present MIMP: a postgraduate Masters program in Medical Informatics and Bioinformatics, introduced by Helwan, Ain Shams and Suez Canal Universities in Egypt. The objective of the article is to present MIMP, the course structure and course delivery methodology of the program and to stimulate discussion about effectiveness and relevance of MIMP at Egypt.

Introduction

With the wide spread of hospitals and other medical institutions in Egypt, the need for computer-based systems seems to be indispensable. However, due to the lack of properly qualified graduates the vast majority of work in the medical sector is still manually done. To qualify graduates to work effectively in this area we have elaborated a project, called MIMP, which stands for "Introducing Medical Informatics and Bioinformatics Master Curriculum in Egypt." The project started on September 1, 2004 and lasts for three years.

Medical Informatics (MI) is the scientific discipline that contributes to improving healthcare by effectively utilizing information technologies. The field broadly encompasses all areas of application in health, clinical practice, and biomedical research. Usually MI is defined as has four "cornerstones" of the discipline. Three are grounded in information technology -- representing clinical knowledge, acquiring and representing clinical data, and integrating information to support clinical decisions. The fourth cornerstone is managing change in clinical organizations. With skills in these four areas, medical informatics support the specification, development, implementation, and effective use of clinical systems, including electronic medical record systems and interdisciplinary care management systems. Medical informatics is considered as an essential and pervasive element in all healthcare activity. It is also the name given to an academic discipline developed and pursued over the past decades by a world-wide scientific community engaged in advancing and teaching knowledge

about the application of information and communication technologies to healthcare – the place where health, information and computer sciences, psychology, epidemiology and engineering intersect. The presentation covers the salient aspects of MIMP. It also mentions the methodology that is used to develop MIMP curriculum and the courses included in the program.

MIMP mission

The mission of the Master of Science in Medical and Bio-Informatics Program is to provide an applied graduate educational experience that prepares professionals to participate in and lead multidisciplinary teams in the development, implementation, and management of information technology solutions in health care. Our program emphasizes the applied aspect of using informatics in the health care setting. We strive to provide a practical education that prepares students to effectively participate in development, implementation, and management teams charged with producing information technology solutions that improve patient care and reduce the cost of care. It is not the goal of MIMP to comprehensively cross train individuals from one medical informatics domain for another. We will not make doctors into network engineers or database designers. Similarly, we will not prepare computer scientists or engineers for patient care. This is not our intent. Rather, our intent is to give our graduates the knowledge and skills to identify, recruit and work with expert resources needed for the successful project. Additionally, with electives, and thesis, students have the opportunity to gain additional expertise according to their individual academic and career goals. In brief, the program is designed to meet the educational needs of two types of students:

- The health care professional seeking additional training in information management and technology.
- The non-health care professional seeking training in health information and technology.

MIMP Objectives

The main objectives of the program are:

- To provide students with a theoretical and practical understanding of the role of information in health care.
- To provide students with a sound basis for implementing, developing, maintaining, and managing information resources and systems in health care.
- To provide students skills in the management of health information, technology, and decision making.
- To provide students with research experience in medical informatics.

Career Opportunities

There is a rapidly growing need for skilled professionals who understand both information technology and the health care environment. The management of clinical data is changing from paper to electronic systems utilizing network technology. This change has been accelerated by the advent of managed care, where total quality management and continuous quality improvement are critical and where information technology can help achieve these goals. It is a fact that the demand is great in the healthcare industry for information technology professionals who understand clinical systems, concepts, and terminology, in addition to IT technology, concepts, and applications. There is a severe shortage in the qualified personnel in this area not only in Egypt but also in other Arab states. MIMP is designed to provide the knowledge and skills to bridge these two bodies of knowledge. MIMP provides IT professionals the competencies and credentials needed to support the management phase of their career in health information technology. Graduates of the program will be competent in project management, implementation, and operation of healthcare information systems in the clinical environment. On the other hand, MIMP gives the clinicians the competencies and credentials to select, deploy, and effectively use information technology in clinical practice. In this program the student will receive in-depth education in medical informatics, computer science, health policy and epidemiologic/research methods. Ample elective, research opportunities will enable the student to customize the training to meet his individual needs and career objectives.

As a graduate of the medical informatics program, you will have the education and credentials needed to pursue career opportunities in a variety of settings: integrated service companies that design and install information systems; health care organizations such as hospitals, clinics and health maintenance and managed care organizations; third party insurers; businesses with health care programs for employees; and public health agencies. Research institutions need informatics professionals who can

use information technologies to bridge the gap between patient data registries and health research protocols.

MIMP is the first and the only applied educational program of its type in Egypt and in most of the MEDA countries.

Learning Outcomes

While designing the curriculum we take into consideration the guidelines and rules set by the NQAAC (National Quality Assurance and Accreditation Committee) [1]. These guidelines are essentially the same set by the British Quality Assurance Agency (QAA) [2]. So the curriculum design is based on the intended learning outcomes (ILO).

The program is designed for working healthcare professionals who want to use informatics effectively in their usual role. To this end, students taking this program will expect to:

- Acquire a depth and breadth of knowledge of the principles of information management
- Develop skills in the critical appraisal and assessment of information needs
- Be able to apply those skills in strategic planning of information management in healthcare
- Be able to determine the training needs of others working in healthcare to ensure efficient implementation of a management strategy.

Program Structure

We consulted more than 30 similar programs in different universities in different countries [e.g. 3–5]. In addition to this, recommendations set by concerned bodies were consulted [6]. The variations in these programs is large. Some of these programs are essentially directed to medical doctors [e.g. 7] while others are directed to IT professionals [e.g. 8]. When designing our program we have to take into account the local conditions in Egypt. We started by examining the current curricula in both areas: IT and MD. IT professionals are usually graduated from the Faculties of Computers and Information and from the Computer department in the Faculties of Engineering. Medical doctors are graduated from the Faculties of Medicine. Examining the curricula of both areas of knowledge reveals that it is mandatory to qualify both graduates to the other area. In other words, it seems to be a must to have some courses that will bridge the gaps between both candidates. To have a flexible program it was important to have a wide range of electives to suit different backgrounds of candidates and to fulfill their career objectives.

The Overall requirements for the M.Sc. in Medical and Bioinformatics consists of 36 credits, with a cumulative GPA of at least 3.0 (on scale of 5). This comprises 30 credit hours taught courses and a thesis which counts to 6 credit hours. The program must be completed within 5 consecutive years from

entry into the first graduate course.

Taught courses are structured into three groups: mandatory, core, and elective. The mandatory course is a course given to all enrolled students. Its aim is to have some sort of homogenization of the students with different backgrounds. The second group is comprised of compulsory core courses. These courses will lay the theoretical and practical foundations necessary for a medical and bioinformatics specialist. The third group contains elective courses which enable the student to have some sort of customizing his program to suit his career goals. The research component of the program is realized by requiring the students to complete a research project (6 credit hours) that lasts for at least two semesters. Students may start their research after completing 50% of the taught courses.

Curriculum development methodology

Numerous international postgraduate programs were reviewed in detail. The list of universities from which such programs were collected and analyzed is long and covers European (to a large extent) and American (to a lesser extent) universities. From this list an initial set of courses was formulated and allocated to the three main classes: mandatory, core and elective. Then in two workshops that were held at Helwan University (January and October 2005) the list of courses was critically reviewed by a group of experts and the final list was formulated.

Detailed Structure of the Program

Two mandatory courses are offered. However, each student should take one only of them according to his background. These two courses are:

1. IT for medical specialists: this course is directed to physicians. Its aim is to introduce key IT concepts to them.
2. Life sciences for IT specialists: this course is the counterpart of the previous course. It is directed to IT Graduates in order to introduce them to the basics of life sciences.

There are six core courses. These are:

1. Introduction to Medical and Bio Informatics
2. Healthcare Information Systems and Electronic Health Records
3. Medical Databases
4. Hospital Organization & Management
5. Six sigma quality and patient safety
6. Medical Informatics Case Study Seminar

Elective courses are designed to allow students to customize their program of study. Students should select three courses from the following list.

- Clinical Decision Support Systems
- Medical Imaging
- Remote Healthcare
- Applied statistics and epidemiology
- Ethical & Legal Issues in Medical and Bio Informatics

- Information Systems Project Management
- Knowledge Discovery and Data Mining
- Information Visualization
- Machine Learning
- The Internet and Health
- The thesis is counted as 6 credit hours and can be registered after passing 50% of the taught courses (i.e. 5 courses).

Delivery of MIMP curriculum

We plan to start delivery of the program in September 2006. In the meantime a series of academic staff training sessions are envisaged to be held at Cairo, Heraklion (Greece), Aalborg (Denmark) and Tampere (Finland). Academic staff training The objective of the short training sessions is to acquaint Egyptian academic staff to state of the art technologies and methods underlying ICT support in delivery of health-care. For instance, academic staff training at Crete will focus on "hands on" experience using the Hygeianet system as reference (<http://www.hygeianet.gr>).

Delivery of MIMP is complemented via a e-learning network, which enables students to maintain continuous and seamless communication with academic staff in Egypt and the EU and to have access to relevant resources.

Courses emphasize project structure. Students are encouraged to work in groups on small projects, which are defined according to practical health-care needs.

Conclusions

In this short paper we introduced the master degree program to be implemented in Helwan university in medical informatics. This program is funded by a European fund under the TEMPUS program. The project consortium consists of three Egyptian universities: Helwan, Ain Shams, and Suez Canal. Three other European partners are involved: FORTH in Greece, University of Aalborg in Denmark and VTT in Finland. It is anticipated that the first batch of students will be enrolled in Sep., 2006.

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Needless to mention that opinions and views expressed herein are authors' responsibility and do not necessarily correspond to official Tempus program views.