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# Designing a Curriculum for Distance Learning Programs in Medical Informatics

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## **Report on how Technology is Responding to the Emerging Field of Medical Informatics**

*Medical Informatics* is an emerging discipline that has been defined as the study, invention, and implementation of structures and algorithms to improve communications, understanding and management of medical information. The end objective of Medical Informatics is the coalescing of data, knowledge, and the tools necessary to apply that data and knowledge in the decision-making process, at the time and place that a medical decision needs to be made. The focus on the structures and algorithms necessary to manipulate the information separates Medical Informatics from other medical disciplines where information content is the focus.

The purpose of this paper is to describe a distance learning program as developed at Texas Tech University for working adults with experience in the medical field. This paper also gives a brief overview of Medical Informatics Programs at other universities using the World Wide Web, and how the Distance Learning Program developed at Texas Tech differs.

The proposed program leads to a graduate-level certificate or licenciante in Medical Informatics as offered via Distance Learning at Texas Tech University. Instruction modules, notes, learning guides, and assignments would be available on the Internet. "Chat" Internet Sessions would be held once a week at a time to be arranged. The certificate would be awarded after the completion of 6 courses and a project.

This paper describes the curriculum and the individual courses designed for this new program, as well as the novelty of the program in relation to distance learning programs at other universities using the Internet or World Wide Web. The courses described below include a Preliminary Course in Information Technology and Facilities which is video-based with "Chat Sessions", Medical Informatics I & II, Evaluation Methods for Medical Informatics, Network Telecommunications in Medical Informatics, Clinical Information Systems, Automated Problem Solving in Medicine, Case Studies in Medical Informatics, Special Topics in Medical Informatics, and a capstone Project in Medical Informatics.

## **Introduction**

There are currently about 19 Medical Information Centers in the United States (See Web Site Reference [1].) However none of these addresses the issue of the delivery of a complete Program in Medical Informatics solely by the use of the Internet as a tool for Distance Learning. The programs listed in Web Site Reference [1] use the Internet as a supplement to the instructional aids used in teaching courses in a classroom setting. Below is described the curriculum as designed at Texas Tech University in conjunction with the International Center of Informatics Research (ICIR) within the College of Business Administration (COBA).

## **Curriculum for Medical Informatics by Distance Learning at Texas Tech**

The following has been proposed as the curriculum of courses leading to a licenciante in Medical Informatics as offered via Distance Learning at Texas Tech University. This is to be considered as a role model for similar programs elsewhere.

**INF 1000:** Preliminary Course (Optional): Information Technology and Facilities Video-based with "Chat Sessions".

**MEDINF 5101 *Medical Informatics I: (1<sup>st</sup> Year, 1<sup>st</sup> Semester)*** A survey of fundamental concepts and activities on information technology applied to health care. Topics include computer-based medical records, knowledge-based systems, telehealth, decision support, human-computer interfaces, system integration, the digital library, and educational applications. Extensive links to Medical Informatics Home Pages with other Medical Informatics Centers at other American Universities and around the world will be referred to. Prerequisites: Familiarity with word processor, spreadsheet, database and Internet facilities; prior completion or concurrent study of INF1000 or equivalent.

**MEDINF 5102 *Evaluation Methods for Medical Informatics: (1<sup>st</sup> Year, 1<sup>st</sup> Semester)*** This course is designed to expose students to the wide range of empirical evaluation and research methods used in Medical Informatics, to immense students in

the empirical literature of the field, and to prepare students to design and conduct studies appropriate to problems in the field. Medical libraries and on-line information services such as MEDLINE.

**MEDINF 5201 Medical Informatics II (1<sup>st</sup> Year, 2<sup>nd</sup> Semester)** The focus of this course is on health care information systems in the local area or intra-institutional environment. Topics covered include: advanced computerized patient records, electronic document interchange, computer-supported collaborative work, and advanced clinical information systems, and computer-based training for patients and providers. Prerequisite: INF5101

**MEDINF 5202 Network Telecommunications in Medical Informatics (1<sup>st</sup> Year, 2<sup>nd</sup> Semester)** The applications of telecommunications to the delivery of medical care, including Telemedicine programs, videoconferencing, distance education in medicine, clinical links for primary care physicians, medical coding utilities, and the applications to Medical Informatics Programs at Universities.

**MEDINF 5301 Clinical Information Systems (2<sup>nd</sup> Year, 1<sup>st</sup> Semester) (Required)** This course is an in-depth review of clinical information systems (e. g. electronic medical records). We will review systems of historical interest and representative current systems. Topics will include functional requirements, standards, security, and technology, as well as Internet opportunities for health care.

**MEDINF 5410 Automated Problem Solving in Medicine: (1<sup>st</sup> Year Summer) (Elective)** Topics include applications of expert systems, knowledge-based systems, cognitive models of the fundamental problem-solving process underlying medical reasoning. Other topics such as the applications of multi-media, virtual reality, and information networks, and distributed information systems to Medical Informatics may also be discussed.

**MEDINF 5420 Case Studies in Medical Informatics: (1<sup>st</sup> Year Summer) (Elective)** The course will involve the case studies of Medical Informatics as applied to cases of the individual student's selection using the World Wide Web as tool. A written report will be due at the end of the course.

**MEDINF 5430 Special Topics in Medical Informatics: (1<sup>st</sup> Year Summer) (Elective)** The topics to be included in this course will be determined by the special interests of the students, and may include such topics as Computerized Medical Records, legal aspects of computer-based patient records and record systems, medical imaging using computer technology, medical information text retrieval and extraction techniques, or monitoring and evaluation of infection control methods.

**MEDINF 6000 Project in Medical Informatics (1<sup>st</sup> Year, 2<sup>nd</sup> Semester to 2<sup>nd</sup> Year, 1<sup>st</sup> Semester)** This is the capstone course in the Medical Informatics program. It will consist of either an internship focused on computer applications in a health-related facility with a written report, or an independent study/research project in health care informatics in a topic of the student's selection under the supervision of a faculty member in the Medical Informatics Program at Texas Tech University.

### **Delivery of Web- based Courses in Medical Informatics at Texas Tech University**

The courses described above are expected to be delivered solely on the Web with the exception of on-campus problems sessions which are to be arranged upon demand. Student assignments including exams are to be distributed over the Web and submitted by e-mail, fax, or U.S. mail. Due dates of exams and assignments are expected to be flexible within reasonable limits rather than forced to be due by rigid deadlines.

Since medical professionals are expected to have irregular work hours, e-mail by students is expected to be the primary means of communication. On-line "Chat Sessions" are expected to be arranged when groups of students are available to participate at the same time.

The core of the Web-based training in this program in Medical Informatics is to post weekly on the Web the necessary course materials that ordinarily would be distributed in a traditional lecture based course. Construction of web pages is to be done by available commercial software such as FrontPage 98. Software such as FrontPage 98 provides the capability of constructing "hot-links" to the appropriate web sites or database files from which students would be able to obtain these course materials.

It is also a possibility to include on the Web compressed video of an actual pre-recorded lecture which the students could play at their convenience as many times as needed.

### **Conclusions**

This paper presents a curriculum for a program in Medical Informatics to be delivered solely by use of the Internet. The novelty of the program is that its web-based design includes courses traditionally not taught by Distance Learning. A survey of use of distance learning in Medical Informatics educational programs is described in a separate paper [3].

### *References*

- [1] "Medical Informatics Education Centers", UCDHS Center for Medical Informatics & The UC Davis Health System, University of California at Davis Medical Center, <http://www-informatics.ucdmc.ucdavis.edu/informatics/schools.html-ssi>.
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