THE UNIVERSITY SENATE OF MICHIGAN TECHNOLOGICAL UNIVERSITY

PROPOSAL 8-12
(VOTING UNITS: ACADEMICS)

"PROPOSAL FOR A MASTER OF SCIENCE IN MEDICAL INFORMATICS"

SUBMITTED BY THE COMPUTER NETWORK &
SYSTEM ADMINISTRATION PROGRAM SCHOOL OF TECHNOLOGY

1. GENERAL DESCRIPTION AND CHARACTERISTICS OF PROGRAM

This proposal recommends the establishment of a Master of Science in Medical Informatics at Michigan Tech. Medical informatics, also known as health informatics, is an interdisciplinary field of study that emphasizes the use of computer technology to help organize, analyze, and manage information to improve health care.

Healthcare is currently the nation's largest industry, and its fastest growing field. Medical informatics has been a formal field of study since the early 1970s. Given its complexity, there are several different ways to organize and approach this field. Academic programs generally approach the field from an applications perspective. Medical and health informatics are based upon (a) clinical informatics, with a principal focus on patient care, and (b) general health information systems, with a principal focus on institutional administration. Thus, issues range from storage, retrieval, and interpretation of information in patient care to implementation and management of the complex information systems used in the administration of healthcare. However, as electronic format has become more prevalent in the medical field, security of storage and exchange of sensitive information is critical and enforced by federal regulations. Therefore, designing a medical informatics curriculum with a focus on the security of these systems and data is desirable. The natural environment of medical informatics includes hospitals, physician networks and practice groups, third-party payers and regulatory agencies, and industry suppliers such as pharmaceutical companies, biotechnology companies, and vendors of hospital equipment and medical supplies.

Marquette General Health System (MGHS), a prominent teaching medical institution located in the Upper Peninsula of Michigan, is expected to partner with the School of Technology to provide a comprehensive education and research entity for the Medical Informatics Graduate Program. Some of the benefits from this partnership include:

·   Enhanced validity of research outcomes through application to the current health environment
·   Collaborative opportunities for highly competitive research funding that draw on expertise from both academia and the healthcare sector
·   An up-to-date Medical Informatics curriculum that reflects current practices and examples within the healthcare field
·   Faculty and medical personnel have the opportunity to work together to promote improvements in patient safety

Michigan Tech also plans to collaborate with other academic institutions, healthcare agencies, and insurance companies to conduct research aimed at using technology to help promote better health.

2. RATIONALE

Medical informatics is the intersection of information science, computer science, and healthcare. This field deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine. Established regulations such as the Health Insurance Portability and Accountability Act (HIPAA) include specific security and compliance provisions for the healthcare sector. The advancement of technology in the medical field, accompanied by the requirement to keep sensitive data confidential, creates the need for a graduate program that offers medical informatics education, and provides coursework and study in the critical area of data security.

Michigan Tech University has established strong and growing research in the areas of medical informatics. Likewise, the university has recently made a significant commitment to education and research in this field by supporting the strategic faculty hiring initiative in the area of Health. The addition of the Medical Informatics Graduate Program would strongly support the Health initiative and align with the strategic plan of the university.

The Masters of Science in Medical Informatics is designed to:

1. deepen students' understanding and knowledge of medical informatics and computer/information security;
2. provide students with research opportunities within the field of medical informatics ;
3. provide a flexible curriculum to allow for both traditional and nontraditional graduate students.

Graduates of this program will be qualified in areas such as, hospital and healthcare systems, health informatics firms, research laboratories, computer/information security firms, medical technology firms, public health organizations, medical software companies, insurance companies, and government organizations.

3. RELATED PROGRAMS

Graduate programs in medical informatics or closely related fields exist at a few other institutions, including South Dakota State University, Drexel University, Johns Hopkins, Stanford, and the University of Illinois Chicago. Most of the mentioned programs focus strictly on management and technical aspects of medical informatics. Johns Hopkins provides a similar security infrastructure to accompany their health related courses, but our program has a stronger emphasis on patient records, the electronic medical records system, and the interoperability of these systems. Michigan State University offers online graduate certificate in Public Health Informatics[1], while University of Michigan is currently developing a broad program in health informatics and has identified our proposed medical informatics and referenced the upcoming Michigan Tech's Medical Informatics Program in their Proposal to Launch a Master's Degree and Graduate Certificate Program in Health Informatics[2]

4. PROJECTED ENROLLMENT

We estimate the Graduate Program to have 10-15 degree-seeking students and 10 non-degree seeking students enrolled over the first three years with an anticipated steady-state enrollment of 20-25 students. We expect 25% of the degree-seeking students in the program to be traditional students and the remainder to be nontraditional students enrolled strictly through distance learning. Non-degree seeking students would take courses that can be applied to professional certifications such as the Certified Professional in Heath Information Technology (CPHIT). The courses are highlighted in the next section.

We strongly believe that the unique structure of the proposed graduate program curriculum and the availability of online course delivery will attract both degree seeking and non-degree seeking students.

5. SCHEDULING PLANS

The classes will be taught on the Michigan Tech campus with the majority also offered online. Online courses will be a mix of recorded lectures, virtual labs, webinars, and eLearning (e.g., Adobe Connect). This type of blended learning course meets the needs of distance and on-campus traditional students. Distance education students pursuing Plan B and C programs will be able to complete all the course requirements online, if they choose to do so. The courses not currently selected for online delivery are more suitable for on-campus students who have chosen Plan A and intend to write a thesis.

6. CURRICULUM DESIGN

The Medical Informatics Graduate Program requires 30 credits of course work and research for the MS degree.

Table 1 outlines options and requirements for the proposed Master of Science degree in Medical Informatics. Participating faculty members from across campus will be able to advise Plan A & B students as their schedules permit. Appendixes provide detailed information of recommended course sequence for Plans A, B, and C.

Table 1: MS Degree Requirements

Program	Option	Coursework	Research Credits	Total Credits
MS	Plan A	≥20	≥6-10	≥30
MS	Plan B	≥24	2-6 (to be completed under SAT 5999)	≥30
MS	Plan C	≥33		≥30

Course work – Minimum of 27 credits must be taken from the following Medical Informatics (SAT) courses:

1. SAT 5111 - Security and Privacy (2 credits) * +
2. SAT 5121 - The Healthcare System (2 credits) * +
3. SAT 5131 - System Analysis and Design (3 credits) * +
4. SAT 5141 - Electronic Health Records and e-Health Implementation (3 credits) * +
5. SAT 5151 - Application Integration and Interoperability (3 credits) * +
6. SAT 5161 - Database Management and Security (3 credits) * +

7.   SAT 5211 - Java Security (3 credits) +
8.   SATEE   5723 -   Computer and Network Security (3 credits)
9.   SAT 5231 - Intrusion Detection Analysis (3 credits)
10.   SAT 5241 - Designing Security Systems (3 credits) +
11.   SAT 5251 - Advanced Topics in Network Security (3 credits)
12.   SAT 5261 - Health Informatics Decision and Support (3 credits) +
13.   SAT 5271 - HIPAA Implications for Public Health (3 credits) +
14.   SAT 5281 - Healthcare Security Management (3 credits) +

* CPHIT Certification course
\+ Course offered online

Special Topics – 1-3 credits
15.   SAT 5990 – Special Topics in Medical Informatics

Graduate Research or Practicum – 6- 10 credits
16.   SAT 5998 – Graduate Practicum
17.   SAT 5999 - Graduate Research

7. COURSE DESCRIPTIONS

1.   SAT 5111 Security and Privacy

Examines key health information security, policy and procedures. Investigates how to distinguish elements of a security audit and key security policies. Analyzes the roles of people maintaining health information security and explains elements of these roles within the organization. **(delivery: G. Hembroff)**
Credits: 2.0   Lec-Rec-Lab: (2-0-0)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

2.   SAT 5121 The Healthcare System

Provides an overview of healthcare's transition from paper to electronic format and examines characteristics of healthcare organizations, the interrelationships among healthcare components, the role that government, regulatory, professional and accreditation agencies play within healthcare, and describes the roles of healthcare professionals and the organizational structure in which they work. **(delivery: A. Sapci)**
Credits: 2.0   Lec-Rec-Lab: (2-0-0)
Semesters Offered: Spring **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

3.   SAT 5131 System Analysis and Design

Provides in-depth knowledge of tools that are available to perform systems analysis, examine the key factors to be considered in a systems design, emphasizes the importance of communication through both of these processes, and an understanding of the primary factors in measuring the benefits of systems implementation. Course will also examine strategies and key factors in purchasing systems. This includes analysis of opportunities and risk of integrating single vendor, hybrid, and other factors when examining system acquisition. **(delivery: A. Sapci)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

4.   SAT 5141 Electronic Health Records and e-Health Implementation

Explores the difference between Electronic Medical Record (EMR) and Electronic Health Record (EHR). Discusses challenges and implementation of both EMR and EHR. Provides security analysis of both types of records and the maintenance of these systems. **(delivery: G. Hembroff)**
Credits: 3.0   Lec-Rec-Lab: (2-0-1)
Semesters Offered: Spring **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

5. **SAT 5151 Application Integration and Interoperability**
Defines and explains the role of interoperability in the development of a functioning EHR.   Analyzes predominant standardization in the healthcare field such as ASTM and HL7. Examines the challenges to the development of interoperability in healthcare. **(delivery: J. Tang)**
Credits: 3.0   Lec-Rec-Lab: (2-0-1)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

6. **SAT 5161 Database Management and Security**
Identifies database solutions and key elements of an enterprise data warehouse. Explains how to apply best practices for development of data warehouses and distinguish between a clinical data repository and enterprise data warehouse. Investigates the role of Master Patient Index and the aggregation of patient data in databases. Finally, the course defines security practices for a database environment. **(delivery: R. Maatta)**
Credits: 3.0   Lec-Rec-Lab: (2-0-1)
Semesters Offered: Spring **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate
**Possible course substitution: CS 4421 – Database System

7. **SAT 5211 Java Security**
This course provides comprehensive coverage of the security aspects of the Java platform. Java's security model and the VM and language features that support security are covered. Java APIs and Java Cryptography APIs are addressed in Java security. This course analyzes Java security platforms and Java APIs within the healthcare sector. **(delivery: R. Maatta)**
Credits: 3.0   Lec-Rec-Lab: (2-0-1)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

8. **SATEE 5723 Computer and Network Security**
This course will cover two categories of the topics: One is the fundamental principles of cryptography and its application to network and communication security in general. This part focuses on the introduction of the fundamental tools in cryptography and the protocols that enable its application to network and communication security. The second part covers the advanced topics on MANET (including VANET), WSN, Smart Grid, and Cloud Computing security issues. This part focuses on diverse literature review on the unique challenges (due to the lack of infrastructure and severe resource constraints) faced by MANET/VANET, WSN, Smart Grid, and Cloud Computing for security provisioning. **(delivery: T. Chigan)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Spring
Restrictions: Must be enrolled in one of the following Levels: Graduate
Prerequisite: SAT 5211 and should have already taken computer network course

9. **SAT 5231 Intrusion Detection Analysis**
This course will provide an introduction to the data and methodologies of computer intrusion detection. The focus will be on statistical and machine learning approaches to detection of attacks on computers. Topics include network monitoring and analysis, network based attacks such as probes and denial of service attacks, host-based attacks such as buffer overflows and race conditions, and malicious code such as viruses and worms. Statistical pattern recognition methods will be described for the detection and classification of attacks. **(delivery: X. Wang)**
Credits: 3.0   Lec-Rec-Lab: (2-0-1)
Semesters Offered: Fall
Restrictions: Must be enrolled in one of the following Levels: Graduate

10. **SAT 5241 Designing Security Systems**
This course provides an overview of techniques used in the design of secure systems. Primary focus of the course will be on real-world case studies. Students will examine attacks on deployed systems and then investigate how these vulnerabilities have been subsequently addressed. Additionally, the course will

examine the practical advantages and shortcomings of several notions of provable security. Students will be expected to read, understand, and present recent research papers to the class. **(delivery: Y. Cai)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate
Prerequisites: SAT 5221 and SAT 5111

11. *SAT 5251 Advanced Topics in Network Security*
This course focuses on advanced research topics in communications security and is structured as a research seminar.   Topics include protocol analysis, security in inter-domain routing, broadcast authentication protocols, covert channels and anonymous communication, key management, advanced trace-back schemes, and attack propagation modeling. A course project is required. **(delivery: J. Tang)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Spring
Restrictions: Must be enrolled in one of the following Levels: Graduate
 Prerequisite: SAT 5241

12. *SAT 5261 Health Informatics Decision and Support*
This course addresses issues related to decision modeling based on health sciences data in terms of analysis, construction, and evaluation. Clinical decision support architectures are examined.   An array of decision support tools is considered, and the knowledge representations employed in these tools are discussed. **(delivery: C. Gao)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Spring **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

13. *SAT 5271 HIPAA Implications for Public Health*
This course focuses on the administrative and technical provisions of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which mandates a variety of healthcare standards as well as rules for electronic transactions and code sets. This course is designed to provide system implementers in the public health field with an understanding of and hands-on experience with HIPAA regulations, implications, and a perspective of the impact on the future of the health care information infrastructure regarding the use of information technologies. **(delivery: Y. Cai)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Spring **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

14. *SAT 5281 Healthcare Security Management*
This course will address information security in the public health and medical fields, with special emphasis on clinical care, research and the role of the academic medical center. Course will also focus on disaster recovery and response, anonymization of records, billing, and communication of public health information to EHRs, along with physical and administrative security. **(delivery: C. Gao)**
Credits: 3.0   Lec-Rec-Lab: (3-0-0)
Semesters Offered: Fall **(course offered online)**
Restrictions: Must be enrolled in one of the following Levels: Graduate

15. *SAT 5990 Special Topics in Medical Informatics*
 Medical informatics topics of interest to the faculty and student.
 Credits: variable to 3.0; Repeatable to a Max of 6
 Semesters Offered: On Demand
 Restrictions: Permission

16. *SAT 5998 Graduate Practicum*
 The study of an acceptable security and medical informatics research problem and associated practicum.
 Credits: variable to 6.0; Repeatable to a Max of 6; Graded Pass/Fail Only
 Semesters Offered: Fall, Spring, Summer
 Restrictions: Permission of department required; Must be enrolled in one of the following Levels: Graduate

17. **SAT 5999 Graduate Research**

The study of an acceptable security and medical informatics research problem and the preparation of a thesis.

Credits: variable to 10; may be repeated; Graded Pass/Fail Only

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of department required; must be enrolled in one of the following Levels: Graduate

The actual program of study for each student will be developed in consultation with an advisor and will be based on individual educational goals. Table 2 provides an overview of the schedule of course offerings and the associated instructors. Each of the courses, with the exception of Special Topics in Medical Informatics (SAT 5990), are offered annually. Teaching load for participating CNSA faculty members is based on a maximum of two courses per semester, including current undergraduate teaching assignments.

Table 2: Schedule of Course Offerings

		Credits	Fall	Spring
Double as CPHIT Cert. Course	SAT 5111	2	Hembroff	
Double as CPHIT Cert. Course	SAT 5121	2		Sapci
Double as CPHIT Cert. Course	SAT 5131	3	Sapci	
Double as CPHIT Cert. Course	SAT 5141	3		Hembroff
Double as CPHIT Cert. Course	SAT 5151	3	Tang	
Double as CPHIT Cert. Course	SAT 5161	3		Maatta
	SAT 5211	3	Maatta	
	SAT 5221	3		ECE Faculty
	SAT 5231	3	Wang	
	SAT 5241	3	Cai	
	SAT 5251	3		Tang
	SAT 5261	3		Gao
	SAT 5271	3		Cai
	SAT 5281	3	Gao	

8. LIBRARY AND OTHER LEARNING RESOURCES

The following required medical informatics and security journals and proceedings will be available in the library.

LIST OF JOURNALS (APPROXIMATE ANNUAL COST OF $9,386 [3])

Health/Medical Informatics

1. Applied Clinical Informatics
2. Artificial Intelligence in Medicine
3. Bioinformatics
4. Bioinformation Journal
5. BioMed Central Health Geo-informatics Journal
6. British Journal of Healthcare Computing and Information Management
7. Cancer Informatics

8. Clinical Informatics and Telemedicine
9. Computer Methods and Programs in Biomedicine
10. Computers in Biology and Medicine
11. Electronic Journal of Health Informatics
12. Health Data Management
13. Health Informatics Europe
14. Health Informatics Journal
15. Healthcare Informatics
16. Informatics in Primary Care
17. Informatics Review
18. International Journal of Medical Informatics
19. The Internet Journal of Medical Informatics
20. The Journal of the American Medical Informatics Association
21. Journal of Biomedical Informatics
22. Journal of Clinical Computing
23. Journal of Digital Imaging
24. Journal of Health Informatics in Developing Countries
25. Journal of Medical Internet Research
26. Medical Decision Making
27. Medical Informatics and the Internet in Medicine
28. Methods of Information in Medicine
29. Online Journal of Nursing Informatics
30. Perspectives In Health Information Management
31. Proceedings of the Annual American Medical Informatics Association Fall Symposium
32. Proceedings of the Annual IEEE Symposium on Computer-based Medical Systems Studies in Health Technology and Information

Security
1. ACM SIGPLAN Print : Programming Languages
2. ACM SIGCOMM: Computer Communication Review
3. ACM SIGOPS : Operating System Review
4. ACM SIGCOMM: Computer Communication Review
5. ACM SIGACT : Algorithms and computational
6. Information Forensics and Security, IEEE Transactions
7. Journal of Computer security
8. Journal of Network & Computer Application
9. Journal of Systems and software

9. ADDITIONAL FEES

A university online learning fee of $38/per credit will be required for online courses.

10. FACULTY RESUMES

MICHIGAN TECH
Key faculty members for this graduate program are listed below:

- Yu Cai – Assistant Professor, School of Technology (http://www.tech.mtu.edu/people/yu_cai_CV.pdf)
- Chunming Gao – Assistant Professor, School of Technology (http://www.tech.mtu.edu/people/chunming_gao_CV.pdf)
- Guy C. Hembroff – Chair, CNSA Program/Associate Professor, School of Technology (http://www.tech.mtu.edu/people/guy_hembroff_CV.pdf)
- Robert Maatta – Professor of Practice, School of Technology (http://www.tech.mtu.edu/people/bob_maatta_CV.pdf)
- A. Hasan Sapci – Assistant Professor, School of Technology (http://www.tech.mtu.edu/people/hasan_sapci_CV.pdf)
- Jinshan Tang – Associate Professor, School of Technology (http://www.tech.mtu.edu/people/jinshan_tang_CV.pdf)

11. DESCRIPTION OF EQUIPMENT

The School of Technology has been teaching CNSA for over 7 years. In terms of equipment, the School of Technology already has the following capital assets to support the new program.

- Computer Pcs/Laptops: located in labs EERC #328, 330, and 318 ($70 k)

- Virtual lab architecture[4]: developed for undergraduate program and will be also utilized for graduate program. ($95 k)

- Selected Software (i.e. OpenEMR software, database software, virtualization software): already part of the undergraduate curriculum or open-source software. ($60 k)

- Routers/Switches/Firewalls: already purchased physical equipment and utilizing virtualization for more advanced modeling and testing. ($45 k)

- Biometric Devices: were purchased through recent research projects. ($1 k)

- VoIP Technologies: smart phones and other VoIP technologies were purchased with future use to Medical Informatics Graduate Program. ($4 k)

- Smart Cards: were purchased through existing research project. ($2 k)

- Anticipated purchase of Ultra Sound machine will be purchased through SFHI startup package.

Total current assets are valued at $277,000.

12. PROGRAM COSTS

The anticipated revenue and expenses, based on projected enrollment for the first four years, are presented below. Enrollment is expected to reach steady-state by year four.

Non-degree seeking students are individuals who are registered to take courses, possibly to obtain their CPHIT certificate, but are not enrolled in the Medical Informatics Graduate program.

PROGRAM REVENUE	Year 1	Year 2	Year 3	Years 4-n
Enrollment (MS students)	8	12	15	18
Enrollment (non-degree seeking)	6	8	10	12
Tuition revenue (MS students - 18 credits/year at $702/credit)	$101,088	$151,632	$189,540	$227,448
Tuition revenue (non-degree seeking - 6 credits/year)	$25,272	$33,696	$42,120	$50,544
Total tuition revenue	**$126,360**	**$185,328**	**$231,660**	**$277,992**

ADDITIONAL PROGRAM EXPENSES

Professor of Practice	1	1	1	1
Salary ($37,000 x 1.3625) for first 2 years	$50,413	$50,413	$100,825	$100,825

Salary ($74,000 x 1.3625) after year 2

Journals (5% annual increase)	$9,386	$9,855	$10,348	$10,865
Graduate Assistantships (2 GTAs or GRAs/year)	$46,664	$48,064	$49,506	$50,991
Computer equipment replacement	$5,000	$7,000	$8,000	$8,000
Total non-salary	$61,050	$64,919	$67,854	$69,856
Total annual expenses	**$111,463**	**$115,332**	**$168,679**	**$170,681**
REVENUE – EXPENSES	**$14,897**	**$69,996**	**$62,981**	**$107,311**

One-time Startup Costs:

Marketing & Recruiting	$ 3,000
Online Courses	$ 15,000
Total One Time Costs:	**$ 18,000**

13.   SPACE

The School of Technology has graduate offices located in EERC #228 (seats approximately 8 graduate students). Faculty offices and one research lab has also been secured in the EERC.

14.   POLICIES, REGULATIONS AND RULES

Admission Requirements:

This graduate program is open to excellent candidates who hold a Bachelors degree with sufficient technical and health-related backgrounds in information technology. We anticipate our graduate student population to have undergraduate degrees in technical areas such as: bioinformatics, computer science, computer engineering, health informatics, management information systems, and security/network engineering.

Recommended test scores for admission are as follows:

GRE General Test – combined score of 1200
TOEFL Test: 79 iBT(For International applicants only).

These scores serve as general guidelines for admission. The Admissions Committee, in making its final decision, will consider the combination of professional knowledge, academic excellence, letters of recommendation, and the Statement of Purpose, as well as, GRE and TOEFL scores of the applicant.

15.   ACCREDITATION REQUIREMENTS

None.

16.   INTERNAL STATUS OF THE PROPOSAL

Approved by: Dean's Council
Date: March, 2011

Approved by: Graduate Faculty Council
Date: February, 2010

17.   PLANNED IMPLEMENTATION DATE

Spring semester of 2012.

APPENDIX A: MEDICAL INFORMATICS PLAN A COURSE SEQUENCE FLOW CHART

APPENDIX B: MEDICAL INFORMATICS PLAN B COURSE SEQUENCE FLOW CHART

APPENDIX C: MEDICAL INFORMATICS PLAN C COURSE SEQUENCE FLOW CHART

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[1] http://www.reg.msu.edu/AcademicPrograms/ProgramDetail.asp?Program=2842

[2] http://www.regents.umich.edu/meetings/04-11/2011-04-X-1.pdf

[3] Ellen Marks, Library Director on 3/24/11: Based on the above submitted list, the estimated total of required literature is $9,386 annually.

[4] As the Medical Informatics Graduate Program increases to a steady-state level, upgrades to the virtual architecture will need to occur.

Introduced to Senate: 2 November 2011
Approved by Senate: 16 November 2011
Approved by Administration: 23 November 2011
Approved by BOC: 09 December 2011
Approved by State: 20 January 2012