New Program Proposal
Master of Science, Health Informatics
Medical University of South Carolina

Summary

The Medical University of South Carolina requests approval to offer a program leading to the Master of Science degree in Health Informatics to be implemented in Fall 2014. The proposed program is to be offered through blended instruction. The following chart outlines the stages for approval of the proposal; the Advisory Committee on Academic Programs (ACAP) voted to recommend approval of the proposal to the Committee on Academic Affairs and Licensing (CAAL). The full program proposal is attached.

Stages of Consideration	Date	Comments
Program Planning Summary received and posted for comment	11/1/2012	ACAP members expressed support for the proposed program. USC ACAP member voiced concern about the program duplicating USC Columbia's Master in Health Information Technology program. CHE staff recommended that the full proposal describe the differences in this program and USC Columbia's Master in Health Information Technology and USC Upstate's M.S. in Informatics. In addition, that the institution explore ways in which the proposed program could collaborate with the two existing programs.
Program Proposal Received	4/24/2013	
Comments and suggestions from CHE staff to the institution	6/3/2013	Staff suggested edits for clarity and requested additional information about enrollment, programmatic assessment, and library resources.
Revised Program Proposal received	6/7/2013	Revisions made for clarity, to provide additional information about programmatic assessment and library resources, and to answer questions about enrollment.
Program Proposal posted to ACAP members for review	6/13/2013	
ACAP Consideration	6/20/2013	ACAP members asked for a more thorough description of how the program differs from USC's. ACAP voted to recommend approval of the program.
Revised Proposal Received	7/29/2103	Revisions made to better explain the differences.

Recommendation

The staff recommends that the Committee on Academic Affairs and Licensing commend favorably to the Commission the program at MUSC leading to the Master of Science degree in Health Informatics to be implemented in Fall 2014, provided that no additional "unique cost" or other special state funding be required or requested.

Proposal to the
South Carolina Commission on Higher Education

from

Medical University of South Carolina

For the program:

Master of Science in Health Informatics

April 12, 2013

Raymond Greenberg, MD, PhD
President
Medical University of South Carolina

Karen A. Wager, DBA
Professor
Department of Healthcare Leadership and Management
College of Health Professions
151 Rutledge Avenue, Suite A321
Charleston, SC 29425
Phone: 843-792-4492
Fax: 843-792-3322
Email: wagerka@musc.edu

CLASSIFICATION

Program Title: Master of Science (MS) in Health Informatics

Academic Unit: Medical University of South Carolina
                                     College of Health Professions
                                     Department of Healthcare Leadership and Management

Designation, Type, and Level: Master of Science in Health Informatics

Proposed Implementation Date: Fall 2014

Program Identification: New

CIP code: Medical Informatics 51.2706

Site: Medical University of South Carolina (MUSC)

Program qualifies for supplemental Palmetto Fellows Scholarship and LIFE Scholarship Awards: No

Delivery Mode: Blended format (primarily online with one on-campus session per semester)

INSTITUTIONAL APPROVAL

This proposal has been reviewed and approved by the following internal review bodies at MUSC:

College of Health Professions (CHP) Leadership Council—February 21, 2013
Office of the Provost and Vice President for Academic Affairs—March 19, 2013
MUSC Board of Trustees—April 11, 2013

PURPOSE

In response to the high demand for educated and skilled professionals in health care information technology (IT) and data analytics, the Department in Healthcare Leadership and Management in the College of Health Professions (CHP) at the Medical University of South Carolina (MUSC) proposes to offer a 36-credit hour Master of Science in Health Informatics, designed primarily for working health care professionals. [*Note*: Our initial proposal was 45-credit hours. Upon closer review of comparable health informatics programs nationally, we found that most were approximately 36 credit hours. We believe the change from 45 to 36 credit hours will make the proposed curriculum more manageable for working health professionals (target student), while still providing ample coverage of key content. Course content was restructured to accommodate the reduction in credit hours.]

Informatics is the science of information. Within the context of health care, the terms health informatics and biomedical informatics are often used interchangeably. For our purposes, we refer to biomedical informatics as "the interdisciplinary field that studies and pursues the effective use of biomedical data, information, and knowledge for scientific inquiry, problem

solving and decision making, motivated by efforts to improve health."[1] Individuals trained in biomedical informatics study the collection, organization and application of information in health care and medical research. They are frequently involved in *theoretical research* and in the conceptual design and building of health care information systems including decision support applications. Many biomedical informatics professionals work at universities, academic medical centers, and in biotech and pharmaceutical industries. Health informatics is an *applied field* and individuals trained in health informatics generally work in health care provider organizations and settings and are skilled in the application and use of health information and data analytics. They are generally involved in applied research that examines issues such as the impact of health information technology on quality of care, patient safety, and efficiency. They often focus on patient-level and population health data and comparative effectiveness research.

Our proposed MS in Health Informatics program is designed to ensure graduates are prepared (a) to select, implement, use, and evaluate health care information systems such as electronic health records (EHRs) and data management and analytic systems; (b) to lead organizational efforts in health informatics and IT; and (c) to apply data analytical skills to transform patient care and the care delivery process. The program will offer a thesis option to students interested in conducting health informatics research.

Biomedical informatics, including health informatics, is central to the State and MUSC. As South Carolina's *only* Clinical and Translational Science Award (CTSA) center and one of 60 centers nationally, the CTSA program in the National Center for Advancing Translational Sciences (NCATS) Division of Clinical Innovation supports a national consortium of medical research institutions that work together to improve the way clinical and translational research is conducted nationwide to enhance its efficiency and quality. Its goals are to accelerate the process of translating laboratory discoveries into treatments for patients, to engage communities in clinical research efforts, and to train a new generation of clinical and translational researchers.

The proposed MS in Health Informatics is vital to MUSC's overall strategic plan in bolstering its biomedical informatics activities, the CTSA renewal process, and in ensuring that South Carolina is competitive nationally in biomedical sciences and a knowledge-driven economy.

Program Objectives
The proposed MS in Health Informatics is designed to prepare graduates to:

1. Effectively lead health information system selection, implementation, and evaluation projects.
2. Assume a leadership role in strategy planning and ensure alignment of information systems plan with overall organizational strategic plan.
3. Evaluate and optimize workflow and design efficient systems and processes.
4. Assess the value and potential impact of new and emerging informatics approaches in health care delivery.
    a. Optimize the use of health information technologies such as electronic health records (EHRs), clinical decision support, health information exchange, and data warehouses.

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[1] Kulikowski, CA, Shortliffe, EH, Currie, LM, et al. (2012). AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline. *J Am Med Inform Association*, 19: 931-938.

       b. Understand various coding systems, terminology/nomenclatures, and relevant health information standards used in analyzing health data and in facilitating health information exchange.

5. Conduct evaluation studies examining the impact of health IT on quality, safety, efficiency and costs.
       a. Make data-driven decisions.
       b. Evaluate comparative effectiveness research.
6. Effectively manage health IT staff and project teams.
7. Participate in and/or conduct research in health informatics; analyze data from large datasets (e.g., clinical data warehouse) for decision-making.
8. Work effectively with health IT vendors and business associates including health information exchange organizations.
9. Discuss current health policy, privacy, and security regulations relevant to the use and adoption of health information technology.
10. Communicate effectively with systems designers, programmers, network engineers, and other technical personnel as well as clinicians and health care administrators.

JUSTIFICATION

A. Need for Program and Contributions to Economic Development in State

The United States is in the midst of its largest health IT investment ever as the majority of health care organizations are in the throes of implementing or upgrading their EHR systems. Driven largely by the influx of federal incentive dollars available through the Health Information Technology for Economic and Clinical Health Information (HITECH) Act of 2009, eligible hospitals and physician practices seek not only to adopt EHR systems but to demonstrate "meaningful use,"[2] indicating that providers have achieved certain thresholds and quality indicators.[3] Providers who fail to achieve meaningful use by 2015 will experience a reduction in Medicare payments. Furthermore, with impending changes in reimbursement, a shift from fee-for-service to fees determined by outcomes/quality, health care providers must have the tools to easily capture, analyze, and act on patient and population-level health information. Individuals trained in health informatics with strong leadership and data analytical skills will be critical to the organization's success[4] and ultimately, to the nation, in improving quality of care and containing health care costs.

Graduates of the program will be prepared to assume positions as data analytics officers, clinical system analysts, health IT project managers, and chief medical/nursing information officers in hospitals, physician practices, and other health care settings. We conducted a market analysis survey of major hospitals in South Carolina with responding hospitals ranging in size from 90 to 1200 beds. Based on a ratio of staff-to-hospital beds, we found a reported statewide need of at least 415 new certificate-trained and 71 master's degree trained health informatics specialists in South Carolina within the next two years alone. National reports indicate a high demand for health information professionals at all levels. A recent national survey found that 70% of health insurers, 48% of hospitals, and 39% of pharmaceutical/life sciences plan to increase hiring of

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[2] Centers for Medicare and Medicaid Services (CMS), EHR Incentive Programs; Accessed online at https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html?redirect=/EHRIncentivePrograms/

[3] CMS EHR Meaningful Use Criteria, Accessed online at https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Meaningful_Use.html

[4] Needles in a Haystack—Seeking Knowledge with Clinical Informatics, PwC Health Research Institute, February 2012.

health informatics professionals over the next several years[5]. Although the Bureau of Labor Statistics does not currently report on health informatics as a designated profession, it predicts employment in computer systems design and related services will grow by 48% by 2018. Concurrently, health care jobs will grow by four million, accounting for 26% of all jobs in the US economy[6]. Chief information officers indicate their biggest barrier to implementing EHRs is a shortage of IT staff, including those with clinical expertise.

Hersh and Wright estimate over 40,000 health informatics professionals are needed nationally[7] [8] Using Hersh's methodology and extrapolating by state, we calculate between 1,100 and 2,800 full-time equivalent health IT professionals are currently needed in SC hospitals alone, not including other types of health care organizations. This range of need accounts for varying levels of health IT use in hospitals and is likely to increase to the higher end as more organizations adopt advanced EHR systems. Organizations are particularly in demand for individuals skilled in data analytics to effectively manage patient care and populations of patients in a cost-effective manner[4].

The field of biomedical informatics is the intellectual foundation of current health IT systems (including effective organization, analysis, management, and use of information) and is essential to any progressive vision for 21st century health care delivery. Strategically placed investments across the state will enable South Carolina to attract the best clinicians and scientists strengthening its role as a leader in the health/biomedical informatics field leading to substantial economic development gains through large research grants, industry partnerships, and entrepreneurial opportunities.

B. Centrality of Program to Institutional Mission

The proposed MS in Health Informatics is directly aligned with the mission of MUSC. As an academic medical center and a public institution of higher learning, MUSC's mission is to preserve and optimize human life in South Carolina and beyond. The university provides an interprofessional environment for learning and discovery through education of health care professionals and biomedical scientists, research in the health sciences, and provision of comprehensive health care. As mentioned earlier, MUSC is also one of 60 CTSA funded centers nationally. Translational research is increasingly data intensive. An integral part of the CTSA program is a robust informatics program for enabling and advancing translational research[9]. The data required for translating basic discoveries into clinical therapeutics and diagnostics and their testing and use in appropriate patients requires collaboration across many disciplines, including health care, research, and public health. Moreover, the amount and types of data (e.g. clinical, laboratory and genomics) that need to be integrated to generate knowledge is growing. Such integration would not be possible without informatics expertise. Additionally, in order to bridge the communication gap, educating translational researchers in informatics processes and procedures is a growing need in the CTSA program nationally.

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[5] Needles in a Haystack—Seeking Knowledge with Clinical Informatics, PwC Health Research Institute, February 2012.

[6] Bureau of Labor Statistics, Accessed online http://www.bls.gov/news.release/archives/ecopro_12102009.pdf

[7] Hersh, W. and Wright, A. (2008). Characterizing the health information technology workforce: Analysis from the HIMSS Analytics Database.
[8] Hersh, W. (2010). The health information technology workforce: Estimations of demands and a framework for requirements. Applied Clinical Informatics, 197-212.
[9] Institutional Clinical and Translational Science Award. RFA: http/grants.nih.gov/grants/guide/rfa-files/RFA-TR-12-006.html.

One of the strategic goals of MUSC is to enhance its standing nationally as a top academic medical center. In order to compete as a premier academic medical center and institution of higher education in the country, the development of informatics expertise and an informatics program must be accelerated. Most other top biomedical research institutions in the country either already have or are currently building strong academic and research informatics programs. The proposed MS in Health Informatics program will add a critical element to the growing informatics effort at MUSC, will provide a catalyst for future recruitment of top informatics educators and experts to the state, and will enhance growth in biomedical informatics statewide by providing expertise in integration of clinical, genetic/genomic and metabolomic data, placing South Carolina at the forefront of the field of biomedical sciences.

C. Relationship of the Proposed Program to Other Related Programs within Institution

The Department of Healthcare Management and Leadership (DHLM) within the College of Health Professions at MUSC is ideally suited to offer this master's degree program. The Department currently offers a Master in Health Administration (MHA) program in two formats, residential and executive, and a Doctoral program in Health Administration and Leadership (DHA), delivered in an executive format and online. Three faculty who currently teach in the MHA and/or DHA programs have expertise in health informatics and/or data analytics, and will have a teaching role in the new program. One has done extensive research using national databases to assess the impact of health IT on quality, safety and efficiency. A second faculty member is primary author on a leading textbook in managing healthcare information systems and has expertise in evaluation of health IT projects. The third faculty member has extensive data analytics experience using archival clinical databases. All are outstanding educators; in fact, two have received MUSC Health Sciences Foundation awards for their excellence in teaching.

In collaboration with DHLM, key faculty from the College of Medicine at MUSC participated in the design of the proposed curriculum--Jihad Obeid, MD Associate Professor and SmartState[10] Endowed Chair for Biomedical Informatics and Robert Warren, MD, PhD Professor and Chief Medical Information Officer. Both are trained in biomedical informatics, and have expressed interest in teaching and/or mentoring students in the new program. MUSC is also establishing a new Center for Biomedical Informatics and actively recruiting a Center Director (to fill a vacant SmartState Endowed Chair position in Informatics). The Center Director should be appointed by summer 2013. The new Center for Biomedical Informatics intends to recruit two new faculty to bolster the research and academic missions in informatics. The new Center Director and faculty will be advisory to the program, and serve as mentors to students. Other faculty across campus (e.g., in nursing, pharmacy) with expertise in informatics may serve as guest lecturers.

The proposed program is also strongly aligned with MUSC Medical Center, which has a long and distinguished history of health IT use, maintains a large clinical data warehouse, and is a key player in the Health Sciences South Carolina (HSSC) initiative. In addition, the success of MUSC's CTSA is heavily reliant on having a strong academic program in informatics. The program intends to work closely with faculty in the Center for Biomedical Informatics at MUSC.

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[10] SmartState Endowed Chairs are renowned scientists and engineers who lead centers for excellence and economic development in South Carolina (more at http://smartstatesc.org/).

D. List of Similar Programs in the State

According to the SC Commission on Higher Education directory, two other master's degree programs in health information technology and informatics with a focus on health information management exist. The College of Hospitality, Retail and Sport Management (in collaboration with the Arnold School of Public Health) at the University of South Carolina recently started a Master in Health Information Technology. This 36 credit hour program is designed for working professionals and includes five core courses and five electives. Students are also required to complete a minimum of 250 hours of approved health information technology experience.

A second related program at USC Upstate, recently requested approval by the CHE for a MS in Informatics with tracks in Health Information Management and Information Resource Management, to be offered at its Spartanburg and Greenville campuses. This 30 credit hour program will accept its first class in the fall 2013. Courses will be offered in the evenings and supplemented with Web-based instruction. The program is targeted to meeting the workforce health information management needs in the Upstate. The curriculum is business oriented.

The University of South Carolina, Clemson University, and the College of Charleston all offer graduate programs in computer science, information systems and/ or discovery informatics. None of the programs have a health care focus. We intend to contract with faculty from the Department of Computer Science at the College of Charleston to teach one or two data management courses in the curriculum as MUSC courses.

E. Description of Similarities and Differences between Proposed Program and Other Similar Programs at Other Institutions

Similarities and differences exist between our proposed MS in Health Informatics and the Masters in Health Information Technology offered by USC Columbia and the MS in Informatics (with tracks in information resource management and health information management) offered at USC Upstate. All programs offer core course work in the use and management of health information systems (such as EHR and health information exchange), strategic planning, project management, database management, and privacy and security regulations/standards, and are designed to prepare individuals to assume pivotal roles in health care provider organizations with the expansion and use of EHR systems.

Based upon our discussions with the directors of both programs and our review of their course descriptions, we believe our proposed curriculum has a much greater emphasis on data analytics and preparing graduates who are able to mine large clinical databases and warehouses, and analyze clinical data for decision-making and research purposes. In fact, our proposed curriculum offers a three course sequence (Health Care Data—Content, Standards and Knowledge Discovery; Applied Statistics and Research Methods; Data Mining and Analytics) specifically designed to enable students to develop strong skills in data analytics. Neither of the other two programs in the state appears to have this emphasis in their curricula. Furthermore, our proposed program offers a thesis option for those interested in health informatics research. The Masters in Health Information Technology offered by USC Columbia does not have a thesis option.

As an academic medical center and the only CTSA in the state, MUSC is equipped to provide students with firsthand experience in working with our clinical data warehouse and in conducting health informatics research. Our proposed program is also closely aligned with

MUSC medical center complex, where clinical and administrative information systems are widely deployed. Students may gain firsthand experience with EHR systems, telemedicine/telehealth, patient portals, mobile technologies, and health information exchange, while collaborating with expert clinicians and researchers in the field. From our assessment of the other two similar programs in the state, we believe our emphasis on data analytics and our alignment with the medical center and CTSA are distinguishing features. Otherwise, the programs are similar in focus, and are all designed to address growing workforce demands in the field.

We expect to collaborate with faculty from both programs in terms of research. The DHLM at MUSC intends to host regular research seminars for faculty engaged in health informatics research or interested in collaborating on research. In addition, USC Upstate has expressed interest in collaborating with us by enabling students from both our programs to enroll in joint courses.

Collectively, we believe the three programs offer prospective students a range of graduate school opportunities in a field that is rapidly expanding and help to address the workforce demands within the state. As EHR systems become widely used, the need for individuals who can optimize the management of patient information and can analyze population health data effectively will become vital to improving quality and reducing health care costs. Estimates indicate the demand for graduates will continue to be strong[11].

ADMISSION CRITERIA
Candidates considered for admission into the MS in Health Informatics program are to have earned a baccalaureate degree from an accredited college or university. A GPA of 3.0 on a 4.0 scale is necessary to be competitive. Previous graduate work should reflect a GPA of 3.0 or above. The applicant is also to submit a resume, personal statement indicating how this degree fits in with his/her career goals, and three references from individuals who can comment on the applicant's professional background, academic ability, and personal qualifications. Applicants are to demonstrate basic computer skills (proficient in using word processing, spreadsheet, and presentation software; knowledge of databases) and a demonstrated interest in health IT. Applicants should have at least one year of working experience in health care. Qualified candidates will be interviewed by the Admissions Committee and/or program director; the interviews will be held in person or via Skype.

ENROLLMENT

Enrollment was projected primarily on:
1) Job demand projections made from the results of a state survey of hospitals. We conducted a market analysis survey of major hospitals in South Carolina with responding hospitals ranging in size from 90 to 1,200 beds. Based on a ratio of staff to hospital beds we found a reported statewide need of at least 71 new master's degree trained healthcare informatics specialists in South Carolina within the next two years alone.
2) Extrapolation methods developed by Hersh and Wright in 2008. Using Hersh's methodology and extrapolating by state, we calculate between 1,100 and 2,800 full time equivalent health IT professionals are currently needed in SC hospitals alone, not

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[11] Hersh, W. (2010). The health information technology workforce: Estimations of demands and a framework for requirements. Applied Clinical Informatics, 197-212.

accounting for other types of health care organizations[12]. Approximately 15% of these professionals will require master's degrees.

These enrollment projections assume that MUSC will successfully communicate the demand for program graduates to potential students. This demand for graduates will translate into sufficient applications to meet enrollment projections.

Enrollment assumptions:
1. The program is four semesters long.
2. New students will enter fall of each year.
3. All students will be full-time, i.e. nine credit hours per semester (although we plan to eventually have a part-time option).
4. There may be some student attrition.

Based on discussions with unit representatives within MUSC, we have identified 15-20 individuals interested in enrolling in the first program cohort. Therefore we are confident of the program demand projections.

Table A – Projected Total Enrollment

PROJECTED TOTAL ENROLLMENT						
YEAR	FALL		SPRING		SUMMER	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2014 – 15	15	135	14	135	14	135
2015 – 16	39	360	23	225	23	225
2016 – 17	46	450	23	225	23	225
2017 – 18	46	450	23	225	23	225
2018 – 19	46	450	23	225	23	225

CURRICULUM

The 36-credit hour, four semester program will be offered in an executive format. Students will come to campus once a semester for a long weekend and the remaining course work will be delivered via the College's state-of-the-art distance educational technology. Each semester, two of the courses will require a face-to face component; the other course will be entirely web-based. *Note*: This is the same format as the Executive MHA program and the Doctoral in Health Administration Program at MUSC, both of which have been quite successful in effectively

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[12] Hersh, W. and Wright, A. (2008). Characterizing the health information technology workforce: Analysis from the HIMSS Analytics Database

accommodating the needs of working professionals. In fact, the Department of Healthcare Management and Leadership where the MS in Health Informatics would be housed has more 15 years of experience in offering distance educational programs in this format. Formal and informal feedback we receive from students and alumni has been overwhelmingly positive. Students feel challenged, and frequently tell us they are able to apply concepts learned throughout the curriculum to their individual work settings. We currently use Moodle as the Web-based course management program to deliver distance-based course content. Additionally, Tegrity and Adobe Connect are also used by faculty to supplement instruction and facilitate student interaction.

The curriculum includes nine new courses. Health Care Delivery Systems (HAP721), Health Care Management (HAP719), and Project Management (HAP732) are currently offered by DHLM. The proposed curriculum and descriptions of courses are listed below. Each course is linked to the program objectives listed on page 3 of this proposal. Students will take *either* Database Management or Health Care Delivery Systems, depending on their backgrounds. Students with demonstrated background in IT will be exempt from the Database Management course. Those with backgrounds in health related professions such as nursing, pharmacy, medicine, or allied health will be exempt from the Health Care Delivery Systems course.

Curriculum*

Year 1	**Year 2**
Fall Semester, Year 1 • Health Care Delivery Systems (3) or Database Management (3) depending on student's background • Introduction to Health Care Information Systems (3) • Health Care Management and Leadership (3) *Spring Semester, Year 1* • Health Care Data—Content, Standards and Knowledge Discovery (3) • Applied Statistical and Research Methods (3) • Ethical, Legal and Regulatory Issues in Health Informatics (3) *Summer Semester, Year 1* • Systems Analysis and Design (3) • Advanced Health Information Technology (3) • Elective (3 SH)—from approved listing; or thesis option	*Fall Semester, Year 2* • Data Mining and Analytics (3) • Project Management (3) • Practicum/Field Project (3) or Thesis Option (3)

*part-time option will also be available

Health Care Delivery Systems (HAP-721)
This course provides an introduction to the organization and utilization of health services as well a brief overview of health policy and politics in the United States. Students explore the historical development of the US health care system, private and public health insurance, and current and future modes of care delivery and payment reform (e.g., accountable care). Current issues related to health care quality, access, and costs are examined. Other important topics include population health, changing demographics, technological advances, emerging regulatory patterns, and role of comparative effectiveness research. (Students with health care background may exempt this course). (Objective 9)

Database Management
This course focuses on the fundamentals of database design, data organization and utilization. Topics include database applications in health care settings, end user needs analysis, logical database design, data integrity and database security. Students will be exposed to popular business database programs and real-world examples of databases in health care settings. Other topics include data types, data standards, information classification, and data management practices. (Students with an IT background may exempt this course.) (Objectives 5, 8, 10)

Introduction to Health Care Information Systems
This course provides students with an overview of various clinical and administrative information systems and critical functions used in health care. Key topics include electronic health records, computerized provider order entry, decision support, e-prescribing, telemedicine/telehealth, and revenue cycle. Students explore the history, adoption and use of various types of health care information systems and gain insight into the process of selecting and implementation of health IT systems. Reporting requirements and senior level management issues related to the adoption, use and management of health care information systems are also discussed. (Objectives 1, 2, 3, 4, 8, 10)

Health Care Management and Leadership (HAP-719)
This course focuses on health care management principles and effectively leading and managing change in today's health care environment. Students gain insight into the importance of integrating health information technology into the design of patient care delivery. Leadership traits and theories, organizational behavior, strategy formulation and implementation, change management, team building, and the role of leaders in managing health IT system projects/initiatives are discussed. Other important topics include IT governance, IT capital and operational budgeting, and IT asset management. (Objectives 1, 2, 6, 8, 10)

Health Care Data—Content, Standards and Knowledge Discovery
This course provides an overview of various types of health care data, different strategies for representing data, information and knowledge including terminologies and ontologies, database concepts (data modeling, relational databases, and structured query language), clinical data warehouses and data mining. Students explore the differences between transactional systems and analytical systems. (Objectives 4, 5, 7)

Applied Statistical and Research Methods
This course provides a working knowledge of approaches to the analysis of archival data for research and quality improvement purposes. Students gain practice in reading, understanding, and presenting statistical materials. Topics include data set and variable descriptions; issues of ascertainment bias associated with retrospective data; criteria for the selection of descriptive statistics; visual presentation of parameters; formulation of hypotheses appropriate for the data; multivariable analysis for continuous dependent variables; log transformation and gamma

distribution models; logistic regression; Kaplan Meier curves; controls for selection bias; use of factor and cluster analysis for data reduction. SPSS and/or SAS required. Students are also introduced to research methods and how to critically evaluate the literature. Pre-requisite: Undergraduate statistics course. (Objectives 5, 7)

Systems Analysis and Design
This course provides the student with a fundamental understanding of the systems life cycle, and key processes involved in the analysis, design, implementation, evaluation and ongoing maintenance and support of health care information systems. Students participate in a hypothetical system selection and implementation process and gain experience in defining system requirements, evaluating vendor products, and negotiating contracts. Students also gain experience in mapping clinical workflow and process improvement, and in optimizing the use of health IT to facilitate patient care and improve efficiency. Additionally, students will study different methods for assessing the value of health IT investments. *Pre-requisite*: Introduction to Health Care Information Systems (Objectives 1, 3, 4, 5, 6, 8, 10)

Ethical, Legal and Regulatory Issues in Health Informatics
This course introduces students to the ethical, legal and regulatory issues relevant to the use of information technology in health care. Key topics include protecting patient confidentiality and securing health information; HIPAA privacy and security regulations; legal medical record; licensure and accreditation standards; health information exchange; preventing and managing breaches; business continuity and disaster planning; managing contracts with business associates. (Objective 9)

Data Mining and Analytics (originally entitled Data Management and Data Analytics)
With the continued influx of computers into every aspect of the healthcare environment, huge amounts of data are being generated and stored. To translate the vast amount of data into information and knowledge, health care provider organizations need to be able to extract information knowledge and patterns from data to remain competitive in the market and promote advances in health care (e.g. comparative effectives). Students will gain an understanding of the principles of data mining and will gain hands-on experience in implementing data mining projects. This course will cover techniques and topics that are widely used in real-world data mining projects including classification, clustering, dimension reduction, feature selection, and open-ended knowledge discovery. Class assignments and projects will use real-world data sets and tools to challenge the data analytical skills being learned. Pre-requisite: Applied Statistical Methods for Decision-Making; Database Management. (Objectives 4, 5, 7, 10)

Project Management (HAP-730)
This course is designed to provide students with an overview of how to effectively manage projects within a healthcare organization, with an emphasis on health IT projects. Project management fundamentals such as planning, goal setting, scheduling, resource allocation and management, monitoring and reporting are explored. The importance of governance is discussed. Students will be expected to demonstrate project management tools and techniques through the implementation of a semester-long project. Students gain experience in using project management software. (Objectives 1, 2, 6, 8, 10)

Advanced Health Information Technology
This course provides the students with an in-depth look at concepts in information technology as applied to health care. Topics include electronic medical records, knowledge-based systems, systems integration, human-computer interfaces, decision theory and decision support, digital

libraries, and educational applications. Students will also be exposed to advanced topics in the information technology and health informatics literature. Faculty engaged in health informatics research will also share current research for which they are engaged (Objectives 1, 4, 7)

Practicum/Capstone Project
Students will complete a practicum in a health care facility or an approved capstone project. The practicum will provide the student with hands on experience in participating in some aspect of a health IT project. Students are expected to enhance their knowledge and skills in areas such as project management, workflow analysis, system evaluation and system optimization, and data analytics. Students are expected to apply and synthesize concepts presented throughout the curriculum. (Objectives 1-10)

Thesis Option
Students who are interested in conducting research in health informatics should choose the thesis option. The student will work with a faculty research advisor (and least two other committee members) in developing a research proposal with well-defined problem statement, hypothesis/research question, review of the literature, and methods. Student will present the proposal and conduct independent research study. Thesis requires final defense of research to a Thesis Committee. Thesis may span more than one semester. Prerequisite: Applied Statistical and Research Methods.)

Elective (from approved listing):

> *Informatics and Data Management for Clinical Research (MCR746)*
> *Quality Management in Health Care (HAP632)*
> *Reimbursement Methods for Health Care Organizations (HAP630)*
> *Other approved course*

ASSESSMENT

The MS in Health Informatics program prepares students for careers in healthcare informatics in health services organizations. The program prepares students who are currently working in healthcare to advance in health care informatics positions. Concepts presented in class are reinforced and applied in students' workplace practice settings throughout the students' program of study. Students will take classes in a hybrid model with an on-campus session each semester and through online presentations, readings, postings, assignments, and discussions. The program will assess both program outcomes and student learning outcomes.

Program Outcomes
Assessment of program outcomes will consist of metrics measuring student perceptions of program quality. The following metrics will be monitored:
1. Percent of students who graduate on time.
2. Percent of graduating students who agreed that they made the right choice in selecting MUSC for their education.
3. Percent of graduating students who agreed that they would recommend the program to other prospective students.
4. Percent of graduating students who rated the quality of their education as satisfactory or excellent.
5. Percent of employers who indicated graduates have demonstrated competency.

Data for these measures will be collected through surveys conducted by the university at time of program completion.

Student Competencies
Specific competencies related to the program objectives will be developed by the program faculty with input from a selection of practitioners. Achievement of these competencies will be assessed using three methods:

1. Student self-assessments performed at the beginning of the program and at the end of the program. This will demonstrate the student's perception of their progress through the program.
2. Faculty evaluation of satisfactory demonstration of competencies during the Practicum/Capstone project.
3. Internship preceptor evaluation of the key competencies demonstrated during required summer internship.

Program faculty will establish target values for all measures of program outcomes and student competencies. All program outcomes and summaries of student competency achievement will be presented to the program faculty annually. The faculty will review the measures and make recommendations to program administration for adjustments in program content and delivery where indicated.

<u>FACULTY</u>

<u>Table B – Faculty List</u>

List Staff by Rank (e.g. Professor #1, Professor #2, Associate Professor #1, etc.)	Highest Degree Earned	Field of Study	Teaching in Field (Yes/No)
Professor #1	DBA	Health Information Administration/Information Systems	Yes
Professor #2	PhD	Health Services	Yes
Associate Professor #1	PhD	Health Informatics	Yes
Associate Professor #2	PhD	Health Services	Yes
Associate Professor #3	PhD	Computer Science	Yes
Associate Professor #4	PhD	Informatics	No
Associate Professor #5	MD	Biomedical Informatics	Yes
Assistant Professor #1	PhD	Data Analytics	Yes
Assistant Professor #2	PhD	Health Informatics	No
Assistant Professor #3	PhD	Health Informatics	No

One new full-time doctoral level member will be added to the College of Health Professions faculty as the program director. This individual will be recruited new to the university and will have training and experience in health informatics. The program director is expected to teach four of the twelve didactic courses in the program. Twenty percent of the program director's effort will be administrative.

A second full-time Health Informatics faculty member will be recruited to the university to teach courses in the program. This individual will have training in health informatics with a terminal degree in the field and be appointed as an assistant or associate professor in the College of Health Professions. Both the new program director and the second program faculty member will participate in research and other scholarly activities in the health informatics field.

The balance of the curriculum will be taught within the MUSC Health Informatics program by other faculty members from across the MUSC campus including the Department of Healthcare Leadership & Management, Center for Biomedical Informatics, and from the College of Charleston. All program course directors will have terminal degrees in their respective field of study and be eligible for faculty appointment in the College of Health Professions. Appropriate compensation will be arranged by the MS in Health Informatics program to the home departments of instructors that are not full-time program faculty members for efforts contributed to the program. We have secured agreement from all concerned departments that adequate capacity is available to satisfy the necessary teaching needs.

MUSC supports the professional development of its faculty by providing release time for research and certain special projects such as curriculum development. Colleges and departments administer funds to enable faculty to travel to conferences and seminars for the presentation of research papers. MUSC has developed guidelines for each department to conduct a formal mentoring program for junior faculty. The program included an annual review of the mentee's professional progress and a formal plan for continued success.

One FTE represents a full-time faculty member. A full-time faculty member is a person who has been appointed to the faculty with rank by the vice president for Academic Affairs and provost and has an official record in that office; engages in clinical, instruction, research, and/or administrative activities on the campus of MUSC or any of its affiliated locations; may or may not be tenure eligible; receives monetary compensation for professional services solely from MUSC or an MUSC-sanctioned source, including any of MUSC's affiliates and the VA Hospital; and is engaged 100% in MUSC-sanctioned activities during the specified period of performance.

Table C – Unit Administration, Faculty & Staff Support

UNIT ADMINISTRATION, FACULTY, AND STAFF SUPPORT						
YEAR	NEW		EXISTING		TOTAL	
	Headcount	FTE	Headcount	FTE	Headcount	FTE
Administration						
2014 – 15	1[1]	0.2	0	0	1	0.2
2015 – 16	0	0	1	0.2	1	0.2
2016 – 17	0	0	1	0.2	1	0.2
2017 – 18	0	0	1	0.2	1	0.2
2018 – 19	0	0	1	0.2	1	0.2
Faculty						
2014 – 15	2	2	0	0	2	2
2015 – 16	0	0	2	2	2	2
2016 – 17	0	0	2	2	2	2
2017 – 18	0	0	2	2	2	2
2018 – 19	0	0	2	2	2	2
Staff						
2014 – 15	1	.5	4	.9	5	1.4
2015 – 16	0	0	5	1.4	5	1.4
2016 – 17	0	0	5	1.4	5	1.4
2017 – 18	0	0	5	1.4	5	1.4
2018 – 19	0	0	5	1.4	5	1.4

[1]20% of Program Director's effort

PHYSICAL PLANT

The College of Health Professions moved into its new 80,000 square feet educational complex at 151 Rutledge Ave in August 2005. For FY 2006, the college occupied 78,408 assignable square feet (ASF) with 40,274 ASF designated for administration, 6,887 ASF designated for clinical, 9,989 ASF designated for research, and 21,258 ASF designated for teaching. In the area of technology, the college has implemented a wireless technology plan, 11 advanced "smart" classrooms, and the use of a simulation lab.

On-campus program class sessions will be delivered using the physical facilities of the College of Health Professions at the Medical University of South Carolina. Adequate classrooms exist and are available in the College of Health Professions to provide adequate seating for the projected enrollment and are equipped with all necessary audio-visual capability to accommodate effective teaching.

Online interaction with students between on-campus sessions will transpire over the internet via the existing Moodle learning management system. All current DHLM faculty members are familiar with the Moodle system which is used extensively throughout the DHLM programs. Faculty members that are new to the program will be trained on the use of Moodle.

EQUIPMENT

No equipment beyond existing classroom and faculty office facilities will be necessary. On-campus classes will be held in the College of Health Professions facilities in Charleston. Online interaction will be facilitated using the MUSC Moodle online learning management system that is currently used by virtually all DHLM faculty members.

LIBRARY RESOURCES

Faculty, staff and students affiliated with the MS in Health Informatics program will be served by the MUSC Library. The Library acquires, manages, and maintains resources of knowledge in the biomedical and health sciences in support of the University's overall mission of educating health care professionals, delivering high quality clinical care, advancing medical science through biomedical research, and serving the public of South Carolina. The MUSC Library has a primary mission to serve the greater MUSC family of faculty, residents, fellows, students, researchers, and staff. The Library is also open to the public.

The MUSC Library has available over 220 databases and over 19,000 electronic journals. Housed in an academic health sciences center with the state's only CTSA, the MUSC Library currently provides access to a wide range of biomedical and health informatics resources. Examples of health informatics journals available include *Healthcare Informatics*; *Healthcare Informatics Research; Applied Clinical Informatics; Applied Computing and Informatics; Biomedical Informatics Insights; BMC Medical Informatics and Decision Making; Computers, Informatics, Nursing; Healthcare Information Management; Informatics for Health & Social Care; Informatics in Primary Care; Informatics Review; International Journal of Medical Informatics (Shannon, Ireland); Internet Journal of Medical Informatics; Journal of Biomedical Informatics; Journal of Ocular Biology, Diseases, and Informatics; Journal of Pathology Informatics; Journal of the American Medical Informatics Association; Medical Decision Making; Network Modeling and Analysis in Health Informatics; Bioinformatics*

(Wien); On-line journal of Nursing Informatics; Online Journal of Public Health Informatics; *Sustainable Computing Informatics and Systems; and Telematics and Informatics.* The library also has many other subscriptions to journals that publish applied healthcare informatics articles.

Resources not owned by the MUSC Library can be requested at no charge through the Interlibrary Loan document delivery service. Every effort is made to get an electronic copy of a journal article which on average takes 1.3 business days to obtain. Books can also be borrowed from other libraries. Through PASCAL, faculty and students are able to borrow books held by South Carolina Colleges and Universities within two to three business days (if the book is not checked out). Faculty and students may request that books and journals be added to the collection.

The healthcare informatics students will be provided the same services that are already in place for other distance education students in the Colleges of Health Professions and Nursing. These include reference services via telephone, CHAT or email (Ask a Librarian). In addition to online tutorials, the reference librarians also provide one on one instruction via SKYPE and PING.

ACCREDITATION, APPROVAL, LICENSURE OR CERTIFICATION

After the program is fully established and has at least two cohorts of students, the program intends to seek accreditation through the Commission on Accreditation for Health Informatics and Information Management (CAHIIM) Education.

ARTICULATION

Since students will be employed and have completed bachelor's degrees prior to admission, no articulation arrangements are necessary.

Collaboration with similar programs will primarily be in the area of research. Some interest has been expressed in developing some joint courses with similar programs in the state; however no specific plans or agreements have been arranged.

ESTIMATED COSTS AND SOURCES OF FINANCING

Table D – Estimated Costs and Sources of Financing by Year

ESTIMATED COSTS BY YEAR						
CATEGORY	1st	2nd	3rd	4th	5th	TOTALS
Program Administration	21,120	21,754	22,406	23,078	23,771	112,129
Faculty Salaries	158,810	217,369	222,643	228,077	233,668	1,060,567
Graduate Assistants	0	0	0	0	0	0
Clerical/Support Personnel	58,446	75,823	78,098	80,441	82,854	375,662
Supplies and Materials	750	772	795	820	845	3,982
Library Resources	0	0	0	0	0	0
Equipment	0	0	0	0	0	0
Facilities	0	0	0	0	0	0
Other: recruitment, accreditation	27,500	28,326	32,176	30,050	30,951	149,003
TOTALS	266,626	344,044	356,118	362,466	372,089	1,701,343
SOURCES OF FINANCING BY YEAR						
Tuition Funding	344,435	702,078	803,671	827,781	852,614	3,526,574
Program-Specific Fees	21,070	41,650	46,278	46,278	46,278	201,308
State Funding*	0	0	0	0	0	0
Reallocation of Existing Funds**	0	0	0	0	0	0
Federal Funding	0	0	0	0	0	0
Other Funding (Specify)	0	0	0	0	0	0
TOTALS	365,505	743,728	849,949	874,059	898,892	3,727,883

Table D assumptions:
1. Based on student enrollment described in Table A
2. 100% in-state enrollment
3. Costs and tuition inflation by 3% per year

The MS in Health Informatics program will be financed through tuition and program fees once full enrollment has been achieved. Initial deficits will be supported by the College of Health Professions.