

Descriptive Information:

I. Objectives:

The MS in Healthcare Systems Management will train and educate graduates with contemporary knowledge related to the analysis, planning, implementation, project management, and evaluation of all operational components in a healthcare system. The program provides managers with the needed technical expertise for the efficient operation of health care facilities, including hospitals, nursing facilities, clinics, home care delivery, and pharmacies. The curriculum is designed to introduce engineering management concepts and tools for both reducing healthcare system costs and increasing the quality of healthcare services. System designers and analysts today face the challenge of developing and applying tools, models, and theories as well as utilizing and integrating new information and biomedical technologies that together will shape the healthcare system of the future. The MSHSM program provides a strong basis for the development and delivery of a graduate degree in Healthcare Systems Management which integrates expertise in management methods and tools with healthcare systems knowledge. This will prepare graduates for positions of leadership in all aspects of healthcare operations, including care delivery and evaluation, biotechnology and medical devices, information technology, and healthcare systems consulting.

MSHSM graduates would find jobs in hospitals and healthcare organizations, serving in progressively more responsible positions starting in the quality improvement, decision support, information management, patient accounting, facilities planning, or operations management departments.

II. Need

A. Need for the Program

U.S. healthcare expenditures amounted to \$1.8 trillion in 2004, representing 15% of the Gross Domestic Product (GDP) and making healthcare the largest industry in the United States. The U.S. healthcare industry employs over 10 million people in different settings ranging from nursing homes to academic medical centers. The healthcare environment is increasingly competitive and financially driven. At the same time, healthcare providers have become more involved in managing the health delivery system, in addition to managing patients. As described in a report released by the National Academy of Engineering, tremendous advances need to be made to transform the healthcare systems by efficiently and creatively

integrating proven systems engineering approaches and methods, advanced information and decision support technologies, new communication technologies, and biomedical technologies. Such large-scale effective integration could radically transform the current industry and pave the way to novel approaches for delivering and managing healthcare services in settings ranging from healthcare organizations to the very homes of patients and their families.

To respond to the need for graduates who are qualified to function efficiently in such healthcare systems, institutions of higher education have developed specialized programs and established research centers. The State of New Jersey is in the center of healthcare systems related industries and there is clear need for such a program. The healthcare industry is a very large, complex, and inefficient industry with growing costs being a major concern. The Institute of Medicine put forth four key underlying reasons for inadequate quality of care in the U.S. healthcare system today: (1) the growing complexity of science and technology, (2) the increase in chronic conditions, (3) a poorly organized delivery system, and (4) constraints on exploiting the revolution in information technology. To support these activities there is a need for a technical oriented management workforce that is well versed and skilled specifically in healthcare systems. The proposed MSHSM program therefore serves this important need.

There are a variety of jobs in the healthcare industry that require a strong analytical and systems technical background combined with management knowledge. The program prepares students for pursuing a career track in this job category. Example functional areas include project management, process analysis, information management, facilities management, and resource planning. Companies where our graduates might work include health insurance providers, medical research companies, large group practices, multi-hospital systems, community health centers, pharmaceutical firms, a federal/state agencies, and consulting companies.

B. Describe the relationship of the program to the following: institutional master plans and priorities.

The NJIT vision is to be a preeminent technological research university known for innovation, entrepreneurship, and engagement. Within this vision the university has identified a graduate growth initiative by creating industry focused programs. The healthcare industry represents a sizeable industry in the state and NJIT has specifically identified the biological and biomedical fields as strategic growth areas. The proposed MS in Healthcare Management fits into this overall strategy.

The 1981 Statewide Plan for Higher Education and Research identified NJIT as New Jersey's comprehensive technological public research university, whose role, among others, is to offer advanced instruction

and research in the applied sciences. The Statewide Plan also indicates that NJIT “has a special responsibility to provide technical services and assistance to the state and local government agencies and the industrial community by providing technical programs and undertaking research applied to New Jersey's needs.” Healthcare cost abatement and the improved patient care quality are key needs of NJ citizens, and the proposed program will not only create a technically trained workforce it will also foster the growth of groups and companies that develop new technologies in the healthcare management field.

The recent *Report of the Governor's Commission on Health Science, Education, and Training* recognized NJIT's role in “increasing interactions between the fields of biology, engineering, and computer science.” It is expected that the proposed MS in Healthcare Systems Management would enhance this role.

C. List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

There are a wide range of graduate programs in the US with a focus on Healthcare Management. These programs fall into three types: (i) MBA Specialization – offered as part of the traditional MBA program, (ii) MPH/A – programs focused on public health or administration and (iii) Others – programs with a more technical and systems oriented focus. The program proposed here would fall in the third category. There is only one MS program in New Jersey with a healthcare management focus. This is the MS in Health Systems program at UMDNJ. The focus of that program is on medical research and clinical practice. The program at NJIT will have a strong systems engineering focus, and this will differentiate it from the UMDNJ program. The two programs will cater to different job functions within the healthcare industry.

Exemplary programs in healthcare management that were evaluated in preparing the proposed program include the following:

- Georgia Tech – MS in Health Systems offered as an interdisciplinary program with a strong technical focus. Originated in the Industrial and Systems Engineering Department and includes a large research center. The program has produced more than 600 graduates.
- University of Wisconsin Madison – MSIE with a Health Systems specialization. Trains students to look at broad issues in health care, including patient care and safety, quality improvement and management, health care technology, programs and systems evaluation.

- University of Pennsylvania – MBA in Health Care Management offered by the Wharton School of Business.
- Arizona State University – MS in Health Sector Management. There are three tracks: Management, Policy, and Managerial Epidemiology.

Of these the Georgia Tech program is most closely aligned with the program proposed here in that it has strong emphasis on engineering analysis and tools. Key elements of this program were used to guide the development of the proposed program at NJIT.

III. Students

The target student population would be individuals who have been working in a healthcare related organization for two or more years, and are now looking for additional skills to further their progress their careers in the healthcare industry. Individuals working in a managerial track involved in functions that require a strong analytical and technical background would be candidates for this program. Companies where such individuals work include health insurance providers, medical research companies, large group practices, multi-hospital systems, community health centers, pharmaceutical firms, federal/state agencies, and consulting companies.

Admission requirements will be Bachelor's degree in an engineering discipline, information technology, science, mathematics, or some other technical discipline. The enrollment is expected to be a mixture of part-time and full-time students.

IV. Resources to Support the Program

A. Course Development

The program will require the development of at least four new courses. Two of these are to be included in the core while the remaining two are included in the elective pool. Brief descriptions of the new courses are as follows:

EM 6H1 Introduction to Healthcare Delivery Systems – Definitions of the key healthcare entities; the healthcare workforce; facilities, problems, and costs of delivery; health planning, finance, role of government, alternative delivery models, and health policy. Presentations on healthcare service delivery from individual providers to complex financing and delivery organizations.

EM 6H2 Healthcare Information Systems (Cross listed with IS) - Application of information systems to assist in medical practice including communication within the healthcare enterprise, reimbursement for care, clinical decision making, and assessment of outcomes. Analytical frameworks and methods that can be used to evaluate healthcare information systems, determine requirements, and plan system changes.

EM 6H3 Healthcare Performance and Quality Modeling – Techniques for modeling and evaluating the performance of healthcare operating units, understanding why they perform as they do, designing new or improved operating procedures and systems for competitive advantage, and managing the work force. Application of classical operations research and systems modeling tools to healthcare systems.

EM 6H4 Legal Aspects of Healthcare Delivery - A survey of the legal issues that most frequently arise in healthcare. Students will learn the role of law in promoting healthcare quality, accountability, access, and efficiency. Introduction to tort liability of healthcare professionals and organizations, with an emphasis on standards of care. Other topics address the healthcare providers' obligation to provide care; medical records and patient confidentiality; and health planning and certificate of need.

As the program grows additional courses will be developed, these could include Global Healthcare Systems Management, and Lean Healthcare Systems.

B. Faculty

The department of Industrial and Manufacturing Engineering expects to add at least one new faculty member in the Engineering Management area. This faculty member would be active both in the existing MSEM program and the proposed MSHSM program. The program will also require the recruitment of qualified adjunct faculty who have practical experience in the healthcare field.

C. Libraries and Computing Facilities

This program will draw upon existing courses and upon the same supplemental literature that supports them and other related NJIT programs. Since healthcare management will be a relatively new topic at NJIT some new books and journals will need to be acquired. NJIT's Van Houten Library has a collection of more than 150,000 books and subscribes to more than 1,000 print periodicals and about 8,000 electronic journals.

The library has an adequate number of networked microcomputers that provide access to many bibliographical databases and full-text electronics

journals. Workstations/computers are available for searching the World Wide Web as well as the library's on-line catalog; access to CD-ROM based databases and a variety of on-line journal databases. Journal and conference literature in engineering, science, management, architecture, and other subject areas is accessible through a variety of indexing and abstracting publications in both print and electronic format. Among the databases available on line are CompendexWeb (Engineering Index); Proquest Direct (articles on business, management and industry); Applied Science and Technology Index; and UnCover, a document delivery service that faxes articles within 48 hours.

As a technological research university, NJIT has excellent computing systems, networks and software to support this program. The campus' ATM network backbone connects more than 3,900 nodes in classrooms, laboratories, residence halls, faculty and staff offices, the library, and student organization offices. The network provides access to a wealth of shared information services. Some of these include high-performance computer servers providing CPU cycles for simulation and computational research, disks and data base management systems for storage of large data sets, communications servers for electronic mail and document exchange, databases, digital journal subscriptions and a virtual "Help Desk." A virtual private network combined with Internet access, plus a large ISDN modem bank extend access to campus information resources to faculty, staff and students at home, work, or at any of the university's extension sites or elsewhere.

D. Classrooms and Laboratories

No new classrooms would be needed for this program.

V. Curriculum

MASTER OF SCIENCE IN HEALTHCARE SYSTEMS MANAGEMENT (MSHSM)

Department of Industrial & Manufacturing Engineering

Requirements for the Program:

Admission Requirements:

- 4 year baccalaureate degree
Students applying for admission to this program will have a BS in an engineering discipline, information technology, science, mathematics, or some other technical discipline.
- Undergraduate GPA of at least 2.80 on a 4.0 scale or equivalent

Bridge Program: Students who do not satisfy the admission requirements may take a suitable bridge program of appropriate courses. Such courses do not count towards the graduate degree.

Degree Requirements:

A minimum of 30 credits is required for the degree. Bridge courses, if any, will not count toward degree credits. The graduate curriculum consists of six core courses and four electives, as described in the curriculum below. The electives may include a 3 credit Master's project.

Curriculum:

Suggested Curriculum for MSHSM

Core Courses: (18 Credits)

EM 6H1	Introduction to Healthcare Delivery Systems
EM/IS 6H2	Healthcare Information Systems
EM 602	Management Science
EM 636	Project Management
HRM 601	Organizational Behavior
IE 672	Industrial Quality Control

Technical Electives: (12 Credits – Select 4 from 10)

EM 6H3	Healthcare Performance and Quality Modeling
EM 6H4	Legal Aspects of Healthcare Delivery
EM 6P1	Pharmaceutical Product Management
EM 637	Project Control
IE 604	Advanced Engineering Statistics
IE 650	Advanced Topics in Operations Research

IE 621	Systems Analysis and Simulation
IE 673	Total Quality Management
MIS 648	Decision Support Systems for Managers
MGMT 620	Management of Technology

With advisor approval students will be able to select electives outside of the specified list, including a project option.