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# Giving Your MBA a Medical Industry Orientation

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Minnesota is second to none in its breadth of medical industry firms. It is home to global brands such as medical device manufacturer Medtronic, health insurer UnitedHealth, and health care delivery pioneer Mayo Clinic, and has the largest concentration of firms in the medical device industry in the United States. For over five decades, the University of Minnesota and the medical industry have collaborated in a relationship that continues to yield innovations which save and better human lives, and which fuel the development and growth of this industry. In response to the growth and leadership needs of the medical industry, the Carlson School of Management established the Medical Industry Leadership Institute (MILI) to serve as the global gateway for cutting-edge management research and leadership education for this industry.

Carlson MBA students can now complement their emphasis with a *medical industry specialization*. MILI provides opportunities for students to develop a full-industry approach linking the development of care with the delivery of care. This holistic, integrated perspective on the entire medical industry – from insurance, medical devices, pharmaceuticals, and biotechnology to the delivery of care – provides a focus on critical issues facing the industry today. MILI supports industry specific courses at the Carlson School, draws on the significant scientific, technical, policy, legal, and ethics expertise relevant to the medical industry that resides in other collegiate units of the University, and leverages the concentration of medical industry firms in the Minnesota and the State's position of leadership in the industry. Through MILI, the Carlson School is committed to recruiting the best and brightest students and preparing them for successful and rewarding professional careers in today's leading medical industry firms. (*Additional information on receiving a specialization can be found at <http://www.carlsonschool.umn.edu/Page7190.aspx> )*

## SKILLS DESIRED

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Top employers in this industry look for candidates who have fundamental skills in the functional areas of expertise for which they are hiring and who are able to demonstrate ability to work in and lead multi-disciplinary teams, and abstract, synthesize, and analyze data. Specific industry knowledge desired by prospective employers includes:

- Knowledge of the medical industry as a linked, multi-sector economy comprised of medical device, pharmaceutical, biotechnology, health insurance, and health care delivery industries.
- Understanding of bio-medical basics (i.e., “101” overviews of anatomy, physiology, body systems, drug classes, DNA genomics).
- Familiarity with reimbursements/regulatory basics (U.S. and International) including: FDA (compliance and approval), payment mechanisms, licensing and patents, clinical trials.
- Skill in applying performance measurement across the medical industry – for example, medical technology evaluation and cost-effectiveness analysis.

## PROSPECTIVE CAREERS

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Typical career paths in this industry include entry and advancement in marketing and sales; engineering; finance and corporate development; clinical, insurance and regulatory tracks; management consulting; and investment banking. In addition, a graduate with a well grounded, basic understanding of this inter-connected industry and with progressive management experience in medical industry firms will be well suited for career opportunities in entrepreneurial startup ventures and venture capital firms.

In recent years, 12-20% of Carlson School MBA permanent employment and internship positions have been in pharmaceutical, medical devices/technology, insurance, health care delivery organizations. Companies include:

- Boston Scientific, Guidant, Medtronic, St. Jude's, Sulzer IntraTherapeutics, Incyte Genomics, Orthopedics Innovations, Hearth & Home Technologies,
- Johnson and Johnson, Abbott Laboratories, Bayer, Bristol-Myers Squibb, DuPont Pharmaceutical, Snyder Drug
- BlueCross BlueShield, UnitedHealth Group
- Allina Health System, Mayo Clinic, Massachusetts General Hospital, Fairview Health Services

The Carlson School also has a successful track record of employing students in national consulting and investment banking firms with medical industry/health care practices such as Piper Jaffray, Bear Stearns, KPMG, PricewaterhouseCoopers, Deloitte, McKinsey & Co., and Accenture. In addition, students have been employed by start up ventures such as the MinuteClinic, and by venture capital firms such as Affinity Capital Management and Thomas, Mc Nerney & Partners.

## CAREER OPPORTUNITIES BY EMPHASIS

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Students can learn about the firms in the medical industry and career paths pertinent to their emphasis by attending information sessions and networking events sponsored by the school, student groups (i.e., MILIsa – MILI student association), and MILI. In addition students can take advantage of opportunities to meet with alumni and the numerous practitioners who are brought to the Carlson School to share their experience and expertise with students.

Following is an introductory guide to career opportunities and career preparation for each of the five emphases.

### *Finance Emphasis*

Financial security firms and investment banks, such as Piper Jaffray and Bear Stearns, often organize by industry with the medical industry well-represented. With the emergence of health savings accounts, new careers are becoming available in insurance firms and banks. Today the medical industry is one of the fastest growing segments of the U.S. and global economies. A student opting to complement a finance emphasis with substantial knowledge of the medical industry can improve their opportunities for placement. Students are recommended to take courses that provide knowledge of the medical device and pharmaceutical industry, as well as the health insurance segment.

### *Marketing Emphasis*

Marketing a new medical technology can be a unique and rewarding challenge. This is one of the most regulated industries in the world, with new products spanning from heavy industrial machinery to consumer household products, and with purchasers ranging from patients to physicians and hospitals, knowledge of the landscape of the industry is essential. Courses available through MILI on medical technology evaluation, medical devices and the pharmaceutical industry will be beneficial for career preparation. In addition, other University courses, such as health care journalism from the College of Liberal Arts, are oriented towards careers in medical industry marketing.

### *Supply Chain and Operations Emphasis*

MILI courses are committed to fostering students with an integrated, end-to-end perspective of the health care supply chain, linking the development of care to the delivery of care. Across all industry sectors, hospitals are one of the most complex organizations. There are few large organizations where life and death decisions are decentralized to highly knowledgeable, independent practitioners who are customizing “products” in real time for consumers. The challenges facing a student specializing in supply chain and operations in this industry demand not only a cross-disciplinary approach but also an understanding of the health care delivery environment. For example, concepts of Lean manufacturing processes have direct application to this industry. Lean process design not only encourages greater efficiency, but also reduces delays within a complex organization, and, in the process, saves lives. MILI courses covering issues around the medical device, information technology, and pharmaceutical industry will be relevant. Other Carlson electives and courses offered in the University's Academic Health Center address health care operations and medical terminology, and provide additional learning opportunities for students choosing careers in this area.

### *Information and Technology Emphasis*

The information system demands of the medical industry are increasing daily. Despite the fact that the medical industry creates 17% of the gross domestic product of the US economy, only a small fraction of the actual care is recorded in an electronic medical record. The U.S. government and the CEOs of Fortune 100 firms underwriting health insurance for their workers, are demanding better metrics of health care quality and efficiency. Thus, career opportunities with firms that “wire” the medical industry are starting to take off, and new and existing medical technologies that create the data and support healthcare services are integral to this opportunity. Students taking MILI courses in information technology will have an advantage. The University's schools of medicine, engineering, pharmacy and agriculture also offers courses in specialized healthcare technology applications (e.g., medical informatics, RFID and decision technologies) for this industry.

## EXPERIENTIAL LEARNING OPPORTUNITIES

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*Medical Industry Valuation Lab (MILI 6995)* Recognizing the mutual benefits to be gained through this co-operative program, the Medical Industry Valuation Laboratory seeks to produce medical innovation valuations for University of Minnesota and State of Minnesota clients for high value economic development and professional training purposes using an interdisciplinary team of faculty, students and industry leaders. In this course, teams of students complete rapid production market analysis of promising medical technologies and services to determine potential for success

in market. Students gain exposure to University innovations, venture firms, and inventors. The Laboratory includes graduate students from Carlson, CLA, IT, Law and AHC collegiate units. Enrolled students are assigned to two teams: a project team and a discipline team. Project teams complete evaluations on a rapid basis and are comprised of students across academic units (e.g., CSOM, IT, CLA, Medicine). Discipline teams are based on expertise and generally aligned with the students' collegiate program. Part-time MBA students are permitted to enroll in the Laboratory up to three semesters.

*Medical Technology Evaluation and Market Research (MILI 6589):* Innovations in medical technologies are one of the leading areas of economic growth in the world. Whether new technologies take the form of pharmaceutical, medical device, biotechnology, information technology or some combination of these innovations, the opportunities are extraordinary. Can you make the case for return on investment from these technologies? This course provides 'hands-on' experience to enable future managers to create the value proposition for new medical technologies. Students gain the analysis skills, knowledge and practical experience to climb up the leadership pathways in medical technology, insurance and delivery industries with personal input from industry leaders UnitedHealth Group, Medtronic and the Mayo Clinic.

*New Product Design and Business Development (ENTR 6041 or OMS 6061/6062).* This course involves actual project experience with and for an outside client. Student teams develop a working physical prototype of a product and a comprehensive business plan for its commercialization as the final deliverable for their client firm. The teams are comprised of MBA, MHA and engineering students, and are supervised by faculty from the Carlson School, Institute of Technology, and Medical School. Historically, 50-80% of the new products developed in this course are created for the medical industry. Examples of past client firms include 3M, Medtronic, Boston Scientific, SpineTech, Venturix, St. Jude and Augustine Medical. <http://www.npdbd.umn.edu/>

## MEDICAL INDUSTRY CURRICULUM

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For MBA students interested in pursuing careers in the medical industry, the Carlson School of Management and other University of Minnesota colleges offer a wide variety of courses that will present students with a full-industry approach and prepare them for successful careers with today's leading medical industry firms. These courses will enable students to:

- understand the landscape of the entire medical industry in preparation for leading initiatives with a broad impact in business and society
- engage in detailed analysis of specific topics, firms, and industry sub-sectors
- study with leading scholars engaged in cutting-edge research on topics of significant relevance to the medical industry and in partnership with firms located in the Twin Cities and around the world
- develop skills and knowledge through supervised, hands-on experiential learning opportunities aimed at preparing graduates to "hit the ground running" on leadership tracks in premier firms

## ELECTIVES TO CONSIDER

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### **Carlson School Specialized MBA Electives on the Medical Industry**

#### MILI 6995: Medical Industry Valuation Laboratory

Recognizing the mutual benefits to be gained through this co-operative program, the Medical Industry Valuation Laboratory seeks to produce medical innovation valuations for University of Minnesota and State of Minnesota clients for high value economic development and professional

training purposes using an interdisciplinary team of faculty, students and industry leaders. In this course, teams of students will complete a rapid production market analysis of promising medical technologies and services to determine potential for success in market. Students will gain exposure to University innovations, venture firms, and inventors. The Laboratory will consist of graduate students from Carlson, CLA, IT, Law and AHC collegiate units. Enrolled students will be assigned to two teams: a project team and a discipline team. The project team will complete evaluations on a rapid basis and will be comprised of students across academic units (e.g., CSOM, IT, CLA, Medicine). The discipline team will be based on expertise and will be generally aligned with the students' collegiate program. Students will be permitted to enroll in the Laboratory up to three semesters, but only one semester of participation is required.

***\*Note: This course meets the experiential learning requirement to receive a medical industry specialization***

#### MILI 6990: The Healthcare Marketplace

The healthcare market place constitutes nearly two trillion dollars spent in the U.S. and several trillion spent globally. With the growing demand for medical technology and the aging of the population, the scale and complexity of the health care supply chain is expected to dramatically increase over the next two decades. The health care sector is comprised of several markets for goods and services including physician services, hospital services, insurance, pharmaceuticals and medical devices, and information technology. This course will provide a survey of the health sector to understand the scale, the interactions and interrelationships of the health care markets, the market opportunities offered by different sectors of the health economy, and the barriers in this expanding and global industry.

***\*Note: This course is required to get a medical industry specialization. Requirement waiver may be granted at the discretion of the institute staff.***

#### MILI 6991: Anatomy and Physiology for Managers

Innovations in medical technologies are one of the leading areas of economic growth globally. Future leaders of health care firms will need to work with interdisciplinary teams of clinicians, managers and scientists. For non-clinician managers, the clinical language of health care can be a barrier in the development and effective management of complex medical initiatives. This course will provide: 1) a basic understanding of medical vocabulary for non-clinician managers; 2) an overview of the fundamental physiology of major body systems likely to dominate medical care practice and innovation for the next two decades; 3) a learning template to examine and understand the current clinical practice of a body system; 4) an inventory of the market opportunities of major body systems; and 5) an understanding of the interdisciplinary process of medical technology innovation.

#### MILI 6589 Medical Technology Evaluation & Market Research

Innovations in medical technologies are one of the leading areas of economic growth in the world. Whether new technologies take the form of pharmaceutical, medical device, biotechnology, information technology or some combination of these innovations, the opportunities are extraordinary. Can you make the case for return on investment from these technologies? This course will provide 'hands-on' experience to enable future managers to create the value proposition for new medical technologies. Students taking this will gain the analysis skills, knowledge and practical experience to climb up the leadership pathways in medical technology, insurance and delivery industries with personal input from industry leaders UnitedHealth Group, Medtronic and the Mayo Clinic.

***\*Note: This course meets the experiential learning requirement to receive a medical industry specialization***

### MILI 6235 Pharmaceutical Industry

The development, manufacturing, distribution, economic evaluation, purchasing, utilization management, and ordering of pharmaceuticals is a large and growing portion of the health sector with unique market characteristics, complex regulatory processes, rapid technological change, high expense growth, and vigorously-debated public policy issues. The pharmaceutical industry in Minnesota is growing and dynamic. Boundaries between pharmaceuticals, medical devices and biotechnology are blurring. This course is a joint venture of the Carlson School of Management and the College of Pharmacy at the University of Minnesota. In addition to academic faculty from these schools, the course also engages the participation of key leaders in the pharmaceutical industry and the health sector in general. The panel format, followed by receptions during which students can meet panelists, facilitates opportunities for interaction among guest faculty and students.

### MILI 6726 Medical Device Industry

This course covers the unique business, public policy, regulatory, and technology management issues of the medical device industry. The course features participation by industry leaders from large and small companies, health plans, venture firms, consultants, and law firms in guest faculty panels. Student teams design and present oral reports on current business and policy issues. Students successfully completing this course will understand: the historical development, importance, and future direction of the medical device industry; FDA issues, policies and strategies, public and private sector insurance coverage and reimbursement; interaction between public policies and private sector actions; intellectual property (IP), liability issues, and key issues relating to the start-up and management of new medical technology firms. For students interested in working in the medical device sector or currently working in the field, this course is a must. For those focused on health care delivery, this course provides deep understanding of the challenges in the management of medical technology and its impact on costs, quality, and access to care.

### MILI 6562 Information Technology in Healthcare

The medical industry creates more than 15% of the gross domestic product in the US economy. The IT needs of this industry sector are increasing daily as the government and Fortune 100 firms are demanding better metrics of health care quality and efficiency to make decisions regarding health insurance for their employees. New and existing medical technologies that create the data and support health care services are integral to this industry. Thus, career opportunities with firms that effectively "wire" the medical industry are increasing. This course will prepare students to harness the resources of this emerging health information age by focusing on the theory and conceptual base for health care information technology; applications of current and developing health IT; and approaches to evaluate the effectiveness of health IT systems. The course will offer an overview of information technology, computer technology, and data structures commonly found in health care information systems, as well as current and emerging trends, and strategies for information system design and evaluation.

### MILI 6999 Independent Study

## **Carlson School MBA Electives Relevant to the Medical Industry**

FINA 6241 Corporate Finance Analysis and Decisions  
IDSc 6401 Decision Technologies  
IDSc 6421 Financial Information Systems and Technology  
IDSc 6423 Enterprise Systems  
IDSc 6490 Business Process Excellence  
MBA 6315 Ethical Environment of Business OR

IBUS 6315 The Ethical Environment of International Business  
MGMT 6004 Negotiation Strategies  
MGMT 6050 Management of Innovation and Change  
MGMT 6305 International Environment of Business  
MKTG 6073 Technology Marketing  
MKTG 6051 Market Research  
OMS 6059 Quality Management and Six Sigma  
OMS 6056 Managing Supply Chain Operations  
OMS 6072 Managing Technologies in the Supply Chain  
OMS 6041 Project Management

### **Selected University of Minnesota Courses Relevant to the Medical Industry**

This is a representative sample of courses offered recently at the University of Minnesota. Current offerings may vary. For specific information on courses outside of the Carlson School of Management, please consult the [University of Minnesota course catalog](#). *Prerequisites may apply. Contact appropriate program graduate advisor or instructor. Note that MBA students can apply only 8 non-CSOM credits toward their MBA degree; prior authorization from MBA program is required.*

### **Agriculture, Food and Environmental Sciences**

FSCN 5411 Food Biotechnology

### **Biomedical Engineering**

BME 5151 Intro to BioMEMS and Medical Microdevices  
BME 4001 Biomedical Engineering Design

### **Ethics**

LAW 6875 Seminar: Law, Health, and Life Sciences  
MED 7598 Biomedical Ethics (Independent study)  
PHIL 5325 Biomedical Ethics  
PUBH 6741 Ethics in Public Health: Professional Practice and Policy  
PUBH 6742 Ethics in Public Health: Research and Policy  
PUBH 6801 Health and Human Rights

### **Gerontology/Long-Term Care**

GERO 5110 Biology of Aging  
PUBH 8803 Long-Term Care: Principles, Programs, & Policies

### **Global Health**

PUBH 6780 International Health Systems: Tools for Program Development and Evaluation  
PUBH 6730 International Comparative Health Systems  
PUBH 6732 Topics & Methods in Global Health Assessment

### **Health Informatics**

HINF 5436 Health Informatics Seminars (see <http://www.hinfgrad.umn.edu/seminar/hinfseminar.html>)  
HINF 5430 Health Informatics  
HINF 5494 Topics in Health Informatics  
HINF 8405 Advanced Topics in Health Computer Sciences I  
HINF 8406 Advanced Topics in Health Computer Sciences II  
HINF 8434 Medical Decision Support Techniques  
PUBH 6802 Managing Electronic Healthcare Information

**Health Policy/Economics**

PUBH 3801 Economics and Policy  
ECON 5890 / PUBH 6832 Economics of the Health-Care System  
PUBH 6557/6558 Healthcare Finance  
PUBH 6564 Managed Care  
PUBH 6717 Decision Analysis for Health Care  
PUBH 6845 Using Demographic Data for Policy Analysis  
PUBH 6861 Health Insurance  
PUBH 8813 Measurement of Health-Related Social Factors

**Healthcare Administration**

PUBH 6551 Contemporary Issues in Healthcare Administration  
PUBH 6727 Health Leadership and Effecting Change  
PUB 6780 Management for Clinical Research  
PUBH 6568 Interdisciplinary Teamwork in Healthcare

**Healthcare Journalism**

JOUR 5541 Mass Communication and Public Health

**Industrial Engineering**

IE 5545 Decision Analysis

**Law**

LAW SEMINAR Managed Health Care Seminar  
LAW 6605 Health Law  
LAW SEMINAR Health Law  
LAW 6821 Food Drug Law Seminar  
LAW SEMINAR Health Care Transactions Seminar  
LAW SEMINAR Privacy Seminar  
LAW Employee Benefits  
LAW Insurance

**Medical Terminology**

PHAR 1002 Health Sciences Terminology (Self-study)  
PHAR 5201 Health Sciences Applied Terminology (Self-study)

**Public Affairs**

PA 5701 Science and State  
PA 5711 Science and Technology Policy

**Pharmacy**

PHAR 1001 Orientation to Pharmacy (Online)  
PHAR 1002 Health Sciences Terminology  
PHAR 1003 Nonprescription Medications and Self Care: Treating minor Conditions  
PHAR 1004 Common Prescription Drugs and Diseases (Online; Self study)  
PHAR 3700 Directed Studies: Fundamentals of Pharmacotherapy  
PHAR 4200/5200 Drugs and the U.S. Healthcare System  
PHM 5200 New Drug Development Process  
PHAR 5201 Health Sciences Applied Terminology



PHAR 5700 Directed Studies: Applied Fundamentals of Pharmacotherapy

**Physiology**

PHSL 5510 Advanced Cardiac Physiology & Anatomy

PHSL 5511 Advanced Neuromuscular Junction Physiology

PHSL 5520 Applied Pulmonary Mechanics: Basic Principles

PHSL 5530 Physiology of Drug Absorption, Distribution and Elimination

**Quality**

PUBH 6765 Continuous Quality Improvement

PUBH 6863 Understanding Health Care Quality

**Writing Studies**

WRIT 1152W Writing on Issues of Science and Technology

WRIT 3401 Internet Communication: Tools and Issues

WRIT 3562W Technical and Professional Writing

WRIT 3577W Rhetoric, Technology, and the Internet

WRIT 4258 Information-Gathering Techniques in Scientific & Technical Communication

WRIT 4431 Intersections of Scientific & Technical Communication and Law

WRIT 4562 Theory & Practice in International Business Communication

WRIT 5664 Science Writing for Popular Audiences