

The Globalization of Health Care



Health Sector Advisory Council

November 11, 2016





NanaSteak Restaurant
345 Blackwell Street, Durham, NC 27701

6:30 pm Informal Dinner for Those Arriving Early

Friday, November 11

Kirby Reading Room, The Fuqua School of Business
100 Fuqua Drive, Durham, NC 27708

8:00 am Light Breakfast

8:30 am Welcome and Introduction

- David Ridley, PhD
Faculty Director, Health Sector Management
The Fuqua School of Business, Duke University

8:45 am Welcome and Thoughts on Duke's Efforts Abroad

- Bill Boulding, PhD
Dean and J.B. Fuqua Professor
The Fuqua School of Business, Duke University

Friday, November 11, continued

- 9:00 am** Medical Value Travel
- Chandy Abraham, MS, DNB, MRCS, ADHA
CEO and Head of Medical Services
Health City Cayman Islands
 - Trey Sinyard
Duke MD/MBA Candidate
Intern, Health City Cayman Islands
- 10:15 am** Break
- 10:30 am** Launching Products in Asia
- Sharon Bracken, MBA
President, Point of Care Diagnostics
Abbott
 - David Epstein, PhD
Director, Center for Technology and Development
Associate Professor, Associate Dean Duke-NUS Medical School
 - Rony Golczewski, MBA
Senior Director of Marketing-Emerging Markets
Takeda Pharmaceuticals
 - Manoj Mohanan, PhD
Assistant Professor
The Sanford School of Public Policy, Duke University
- 11:25 am** Break
- 11:45 am** Lunch with Students
- 12:45 pm** Launching Products in Emerging Markets
- Andrew Murray, MD, MBA
Head of Clinical Operations
CareAllies, Cigna
 - Alden Zecha
Co-founder
Sproxil
- 1:15 pm** Disruption in Global Health
- Krishna Udayakumar, MD, MBA
Head of Global Innovation
Duke Health
- 1:45 pm** Looking Ahead
- David Ridley, PhD
- 2:00 pm** Adjourn

Speakers

Chandy Abraham, MS, DNB, MRCS, ADHA is the CEO and Head of Medical Services for the Health City, Cayman Islands, a joint venture of the Narayana Health Group, India with Ascension Health, USA.

Dr. Abraham's prior position, was as the Facility Director (CEO) of Narayana Hrudayalaya, a large cardiac hospital based at Bangalore. He was also the Group Head for Quality for the Narayana Health Group which has 25 hospitals across India.

Dr. Abraham completed his undergraduate medical and postgraduate studies in General Surgery from the prestigious Christian Medical College, Vellore and subsequently held senior administrative positions (Dy. Director and Director) at the Baptist hospital and Redfern hospital in S. India. While in the U.K., he worked at the Sheffield teaching hospitals in England and obtained his membership to the Royal College of Surgeons.

He has had experience as a teacher at the postgraduate level and has trained many doctors in General Surgery and was professor of surgery for the Malaysian Science University's Medical School in Bangalore. Dr. Abraham is a lead surveyor for the Indian Hospital accreditation agency NABH and was a member of the technical committee of this Board.

Dr. Abraham holds certification in lean management from the Cardiff University and has implemented many lean projects in healthcare— leading to cost effective services that are of high quality. Dr. Abraham intends to implement the Health City vision, to provide ethical, high quality specialist medical service in a caring environment which is easily accessible to the people of Cayman, the Caribbean and beyond.

William "Bill" Boulding, PhD is dean of Duke University's Fuqua School of Business. Dr. Boulding is an accomplished scholar with a research interest in evaluating how managers make decisions and how consumers respond. His recent work focuses on the domain of health care, examining the role of the patient experience, clinical adherence to standards and managerial activity in determining the quality of delivered care. His work has been widely published in a number of journals, and Dr. Boulding has been the recipient of numerous research and teaching awards. Dr. Boulding has a passion for helping advance business as a force for good.

He serves as a member of the World Economic Forum's Council on Values and as a board member for the Graduate Management Admission Council (GMAC®), which is the organization that administers the GMAT exam. Dr. Boulding is chair of the Board of Directors of Duke Corporate Education and serves on Swarthmore College's Board of Managers. It has been a privilege for him to serve, at the invitation of the White House, in developing best practices for how business schools can encourage success for women and working families as part of an initiative with the White House Council on Women and Girls and the Council of Economic Advisers. Dr. Boulding joined the New York Federal Reserve in examining the role business schools can play in rebuilding trust in the financial services sector. He is a recurring contributor to LinkedIn and Fortune on the topic of leadership.

Dr. Boulding received his BA in Economics from Swarthmore College and his Ph.D. in Managerial Sciences and Applied Economics from the Wharton School, University of Pennsylvania.



Abraham



Boulding



Bracken

Sharon Bracken, MBA is President of Abbott Point of Care headquartered in Princeton, New Jersey. Since joining Abbott in 2005, Ms. Bracken held global leadership positions in the Diagnostics Division including: Site Director Dartford England and Divisional Vice President Global Operations.

Prior to joining Abbott, she held a number of senior posts with Johnson & Johnson, L'Oreal, Metrologic, and Ingersoll-Rand in Supply Chain, Operations, Engineering, and New Product and Process Development.

Ms. Bracken earned her bachelor's degree in Engineering from Stevens Institute of Technology and has an MBA from Duke University: The Fuqua School of Business.

David Epstein, PhD is the Associate Dean for the Duke-NUS Medical School and the Director for the Center of Technology and Development. Prior to joining the faculty and Office of Research at Duke-NUS, Dr. Epstein was the New York Site-Head, Senior Vice President and Chief Scientific Officer for Oncology Research at OSI Pharmaceuticals, where he was responsible for leading the cancer drug discovery and clinical-translational research efforts conducted by around 140 staff and scientists. Dr. Epstein led OSI's cancer research program from 2006-2013, which was focused on targeting key drivers of cancer development and disease progression. OSI's research effort was built upon the foundation provided by the cancer drug erlotinib, an EGFR-directed tyrosine kinase inhibitor, developed and commercialized by OSI, Genentech and Roche in 2004.

Under Dr. Epstein's stewardship, the OSI team developed an oncology pipeline of four novel small molecule kinase inhibitors along with corresponding patient response biomarkers each of which are in various stages of clinical development to treat lung, ovarian, prostate and other cancers. OSI Oncology Research under Dr. Epstein's mentorship was widely acknowledged for its industry-leading expertise in personalized medicine approaches to cancer care, its numerous academic collaborations, and for uncovering mechanisms through which the mesenchymalization of tumor cells, through the process of epithelial-mesenchymal transition, provides novel routes for resistance to targeted cancer therapies. OSI was acquired in 2010 by Astellas Pharmaceuticals, and Dr. Epstein led the integration and expansion of the OSI and the NY campus into Astellas-Japan research and global development.

Prior to joining OSI Oncology, Dr. Epstein was a principal founder and Vice President of Archemix Corp (2001-2006). While in this capacity, he facilitated the development of two therapeutic aptamers currently in late-stage clinical development for treating wet and dry macular degeneration. Dr. Epstein has 20 years of leadership experience in both the pharmaceutical and biotechnology industries, leading wide-ranging efforts in oncology, ophthalmic and cardiovascular drug discovery.

Currently, Dr. Epstein provides consulting work to biotech, pharmaceutical and venture capital enterprises, and is involved several early-stage biotech start-ups in the New York area.

Dr. Epstein completed his postdoctoral fellowship in structural biology at The Scripps Research Institute in La Jolla, California, in which he led a collaboration between the laboratories of Dr. Stephen Benkovic (Pennsylvania State University) and Dr. Peter E. Wright: Dr. Epstein studied the relationship of protein dynamics to catalysis using the enzyme dihydrofolate reductase (DHFR). Specifically, we examined the DHFR-Folate complex by N15 and C13 NMR relaxation dynamics, and utilized the kinetic insights previously developed in the Benkovic lab to build an hypothesis which linked protein dynamics to enzyme catalytic function. We showed that key aspects of DHFR mechanism and catalytic function could be proscribed by protein motion and dynamics at specific residues and within secondary structural elements. This work led to the refinement and development of a multi-year collaboration between the Benkovic and



Epstein

Wright labs, which further delineated the relationship between protein dynamics and enzymatic catalysis in DHFR.

Dr. Epstein completed his Ph.D. work in The Graduate Department of Biochemistry at Brandeis University under the mentorship of Dr. Robert Abeles, where he studied the mechanism of catalysis of a bacterial elastase which was cloned and then analyzed via the kinetics of mutated enzymes, synthetic substrates, and mechanism-based inhibitors. He obtained his B.Sc. in Chemistry in 1981 from Lewis & Clark College, a liberal arts college in Portland, Oregon.

Rony Golczewski, MBA is the Senior Director, Marketing-General Medicines – Emerging Markets at Takeda Pharmaceuticals based in Singapore. He joined Takeda in August 2015 as the Global Marketing Director – Diabetes. In his current role, he oversees the pre and post launch strategy and activities of the CVM, GI and other General Medicine brands in Emerging Markets, which includes Latin America, Russia/CIS, Turkey, Middle East, Africa and Asia-Pacific.

Mr. Golczewski has been working in the Biotech/Pharmaceutical Industry since he graduated from Duke University in 2004. In the last 12 years he developed extensive International commercial experience at Lilly, Amgen and Takeda, working across most marketing and sales functions at a local, regional and global levels, within multiple therapeutic areas and has been based in countries on 5 continents (Australia, Brazil, Singapore, Spain, UK and US).

Mr. Golczewski holds a double major Civil and Industrial Engineering degree from the Pontifical Catholic University in Rio de Janeiro and an MBA from Duke University. He currently lives in Singapore with his wife and 6 year-old son.

Manoj Mohanan, PhD is an Assistant Professor at Sanford School of Public Policy at Duke University. He also holds secondary appointments in the Department of Economics and the Global Health Institute at Duke.

As an applied microeconomist, his research focuses on topics related to health and healthcare in developing countries including: performance based contracts, measurement of provider quality and performance, social franchising, and social accountability / monitoring. He also studies the role of subjective expectations / beliefs in healthcare behavior.

Several of these projects feature field experiments and policy interventions/evaluations. Dr. Mohanan is currently working on research projects in India, Kenya, and China.

Dr. Andrew Murray is an accomplished health care executive with deep experience in the US and various international markets. He currently serves as Head of Clinical Operations for CareAllies, Cigna's Population Health Management business that supports value-based care solutions. Prior to this, Dr. Murray was Head of Physician Alignment for Cigna's DSAs (partnered products) and led healthcare strategy and business development for Cigna International.

Before joining Cigna, Dr. Murray served in senior leadership roles with Discovery Health, a leading multi-national insurance company based in South Africa, including as Chief Operating Officer for China based Ping An Health (Discovery's joint venture with the Ping An Insurance Group of China) and as Head of Managed Care for Discovery Health. During his early career, he practiced emergency medicine, volunteered for service as a flight doctor for a helicopter ambulance service and served as a flight doctor for International SOS.



Golczewski



Mohanan



Murray



Ridley

Dr. Murray has extensive education and experience in the fields of business, management, and medicine. After qualifying as a physician, he practiced medicine in South Africa and the United Kingdom. He subsequently earned his MBA with a Certificate in Health Sector Management from the Fuqua School of Business at Duke University.

Since graduating from Fuqua, Dr. Murray has served on various Duke boards and maintains deep relationships with the Duke community around the world through regular speaking and teaching engagements.

David Ridley, PhD is the Dr. and Mrs. Frank A. Riddick Associate Professor of the Practice of Business and Economics. He is also the Faculty Director of the Health Sector Management program at Duke University's Fuqua School of Business.

In his research, Dr. Ridley examines innovation, location, and pricing, especially in health care. To encourage innovation in medicines for neglected diseases, Dr. Ridley, with Jeffrey Moe and Henry Grabowski, proposed a priority review voucher prize. The prize became law in 2007. Dr. Ridley received a doctorate in economics from Duke University in 2001.



Sinyard

Trey Sinyard is a fifth year MD/MBA student at Duke University. Originally from Athens, GA, he graduated from the University of Georgia in 2011 with degrees in Finance and Biochemistry and worked for an Atlanta startup firm before matriculating at Duke.

He interned for two months at Health City Cayman Islands in the summer of 2015.



Udayakumar

Krishna Udayakumar, MD, MBA, is the head of Global Innovation for Duke Health and Associate Vice President of Duke University. Dr. Udayakumar is responsible for the development and implementation of global strategy and global business development for Duke Health, across research, education, and healthcare delivery.

He also serves as Executive Director of Innovations in Healthcare, a non-profit organization affiliated with Duke that supports the scale and replication of transformative healthcare solutions globally.

Dr. Udayakumar is Associate Professor of Global Health and Medicine at Duke University and also holds a faculty appointment at Duke-NUS Medical School Singapore.



Zecha

Alden Zecha is founding Partner at health industry consulting firm We Scale Impact and is the Executive in Residence at the Center for the Advancement of Social Entrepreneurship (CASE) at Duke University's Fuqua School of Business.

Mr. Zecha brings to these roles more than 25 years of broad-range executive expertise in operations, strategy and finance, and vast experience from work in more than 35 countries. He has launched numerous multi-million dollar, multi-national initiatives and has raised more than \$15m in capital for ventures.

Mr. Zecha received his MSE and BSE with honors in chemical engineering from Princeton University with a thesis on computer models of HIV treatments.

Pharma in the Future: Regulation and Reimbursement

HSAC
Health Sector
Advisory Council

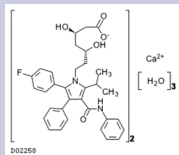

HSM
Duke Health Sector Management

Health Sector Advisory Council
April 8, 2016

Spring 2016 Meeting: The Future of Biopharmaceutical Regulation and Reimbursement

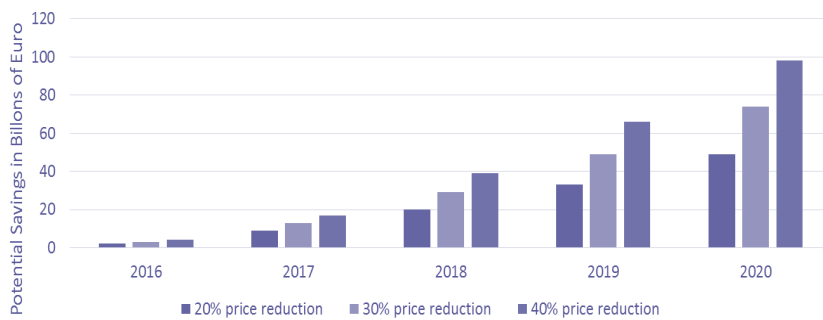
The council opened with a discussion of biosimilars which are beginning to compete with innovative biological drugs in the United States. The increasing availability of biosimilars resulted from passage of the Affordable Care Act (ACA) in 2010, which created a regulatory pathway (short cut) for biosimilar approval. By the time the FDA approved the first biosimilar in 2015, Europe had nearly a decade of experience with biosimilars. Professor David Ridley of the business school gave an overview of biosimilars. Murray Aitken of IMS Health presented data illustrating the European experience

with biosimilars. Mr. Aitken also discussed how the evidence from Europe can be used to estimate potential savings in the U.S. resulting from the availability of biosimilars which tend to have lower prices than the innovator products with which they compete. Andy Swire of Amgen shared the experience of Amgen which will be marketing both innovative biological drugs and biosimilars. Finally, Duke professor Henry Grabowski discussed the economics of the biosimilars market.

| | Pharmaceuticals | Biologics |
|----------------------|--|--|
| Size (MW) | Small (<1000) | Large (>10,000) |
| Source | Chemical synthesis | Cultures of living cells |
| Form | Generally oral solids | Often injected or infused |
| Reimbursement | Pharmacy benefit | Often medical benefit |
| Generic Law | 1984 Hatch-Waxman | 2010 Biologics Price Competition & Innovation Act |
| Example | <p>Lipitor (anti-cholesterol)</p>  | <p>Herceptin (breast cancer)</p>  |

Source: David Ridley

Biosimilar Savings Potential in the EU5 and U.S.
for 8 Key Products in 2015-2020



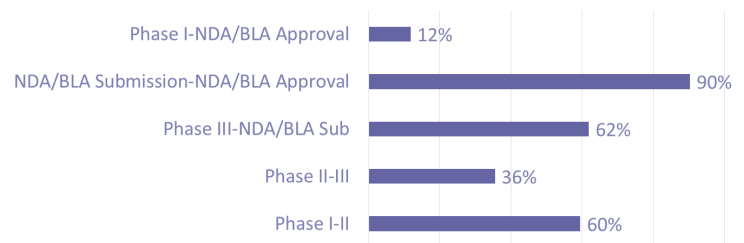
Source: Aitken, IMS Health, 2016

The council then turned its attention to research and development (R&D) for innovative biotech and pharmaceutical products. Professor Grabowski presented his 2016 R&D cost study. His previous cost study, published in 2006, was the most cited paper in the history of the Journal of Health Economics. Professor Grabowski explained the cost estimates and what is included in the estimates and the cost of failed drugs that do not reach the market. Murray Aitken then presented

his 2015 Health Affairs study showing the decline in returns to R&D in recent years. Professor Greg Daniel of the Duke Margolis Health Policy Center discussed lower-cost alternative to clinical testing, including the use of real world data.

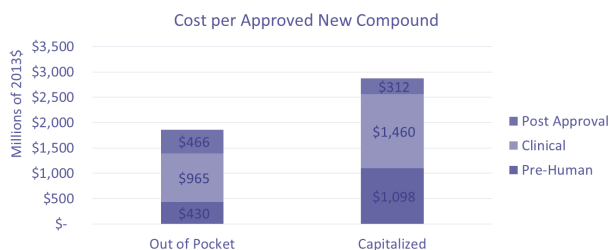
Finally, Professor Arti Rai of Duke Law discussed transparency in clinical trial data. During lunch, council members met with Duke MBA students who are enrolled in the Health Sector Management Program. After lunch, Professor Rai discussed changes in patent litigation for pharmaceuticals.

Probability of Transitioning between Development Phases

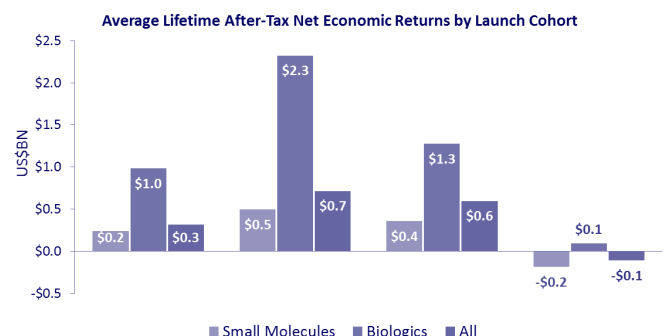


Source: DiMasi, Grabowski, and Hansen (2016)

Professor Ridley wrapped up the meeting and previewed the topics for upcoming meetings. He described the fall 2016 meeting which would focus on globalization in healthcare and the spring 2017 meeting which would examine healthcare priorities for the new President and Congress.



Source: DiMasi, Grabowski, and Hansen (2016)



Economic returns are based on an 11% cost of capital
Source: Berndt, Nass, Kleinrock, and Aitken (2015)



Member Roster

Kelvin Baggett

*Senior Advisor
Pharos Capital Group*

Robert I. Blum

*President and CEO
Cytokinetics*

David Cannady

*Vice President
HCA Strategic Resource Group*

Paula Garrett

*Senior Director, Alzheimer's Global Marketing
Eli Lilly and Company*

Ruth Hancock

*Director, Palliative and Chronic Care
HCR Manorcare*

Tom Kaminski

*General Manager
Enlighten Health Genomics*

Jonathan Meltzer

*Vice President
Laboratory Corporation of America*

David Price

*Representative
U.S. Congress*

Mike Reed

*Vice President and General Manager
Heartland Home Health & Hospice, HCR Manorcare*

Mark Salyer

*Executive Vice President and General Manager
Teva Speciality Pharmaceuticals*

Rina Shah

*Vice President, Clinical Programs
Beacon Laboratory Benefit Solutions, Inc.*

Jon Stonehouse

*President and CEO
BioCryst*

Dan Sullivan

*Executive Business Director, US Value & Access
Amgen*

Bernie Tobin

*President
Crescendo Bioscience*

Duke University Affiliated Members

George Abercrombie, MBA

*Adjunct Associate Professor
The Fuqua School of Business*

Bill Boulding, PhD

*Dean and Professor of Marketing
The Fuqua School of Business*

Thomas Denny, MSc, MPhil

*Professor and Chief Operating Officer
The Duke Human Vaccine Institute and The
Center for HIV/AIDS Vaccine Immunology
Duke University Health System*

Paula Greeno, MBA

*Associate Dean, Global Business Development
and Health Sector Management
The Fuqua School of Business*

Mark McClellan, MD, PhD

*Director, Duke-Robert J. Margolis Center for
Health Policy
Duke University*

Jeffrey Moe, PhD

*Professor of the Practice of Global Health
Duke Global Health Institute*

Richard Payne, MD

*Professor of Medicine and Divinity
Duke University Divinity School*

Arti Rai, JD

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Duke University School of Law*

Barak Richman, PhD, JD

*Professor
Duke University School of Law*

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*Faculty Director, Health Sector Management
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*Adjunct Associate Professor
Duke University Health System*

Frank Sloan, PhD

*Professor
Duke University Department of Economics*

Don Taylor, PhD

*Professor
Duke University School of Public Policy*

Peter Ubel, MD

*Professor of Business and Policy
The Fuqua School of Business*

Health Sector Management

The health sector is increasingly intricate, dynamic and far-reaching – a global network of business, government, and non-profit entities that impacts people and economies like no other. The demand for and development of new health care products and services calls for leaders with both business acumen and insight into the industry's complexities. Equally critical is the need for creative new approaches to improve patient outcomes, access to care and cost management strategies.

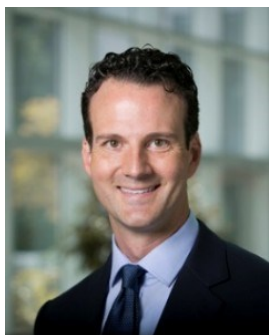


Health Sector Management (HSM) at The Fuqua School of Business leverages Duke University's longstanding leadership in education, research, and clinical care to develop the leaders who will drive and innovate the health care industry. HSM layers the interdisciplinary study of the global health sector onto Fuqua's world-class business management curriculum, providing rich, holistic and lasting learning experiences inside and outside the classroom.

HSM students work closely with faculty and industry leaders to explore and identify answers to health care's most fundamental and emerging issues, among them:

- Health Sector Economics
- Biopharmaceutical and Medical Device Strategy
- Health Systems Management
- Commercialization of Disruptive Innovations
- Health Care Law and Policy
- Financial Management of Health Care

With their understanding of the industry, highly applicable skills, and professional network, HSM graduates join noted public and private organizations to become industry leaders making a difference in healthcare.



"Health care has a major impact on our well being and budgets. Furthermore, health care technology and regulation are always changing. In Duke's HSM program, we help you stay ahead of trends and provide fundamental tools of economics and strategy. With this knowledge you'll have opportunities to make important contributions in business and society."

David Ridley, PhD
Faculty Director, Health Sector Management
Dr. and Mrs. Frank A. Riddick Associate Professor of the Practice



The HSM Certificate is offered as part of the Daytime MBA, Weekend Executive, Cross Continent, and Global Executive MBA Programs.

HSM Students are exposed to a multitude of extra- and co-curricular events and programming that serve to augment their coursework and subsequently their knowledge within the health care industry.



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HSM Daytime Curriculum

Fuqua daytime students must complete six courses to earn the HSM certificate:

- Three required HSM courses.
- Three electives (minimum 9 credits).



Required Courses (Must complete all three)

Health Institutions, Systems, and Policy (HSM Bootcamp) - HLTHMGMT 710:

A detailed overview of the health care system's segments and stakeholders; analyzes the industry's evolution and on-going changes within the sector during the next century.

Health Care Markets - HLTHMGMT 711:

Economics and strategy of the challenges and opportunities faced by product manufacturers, insurers, health care providers, and hospitals.

Seminars in Health Care - HLTHMGMT 705 and 706:

Duke Faculty and external industry experts explore the most current health care issues.

Elective Courses

More than twenty-five elective courses, including:

- Medical Device Strategy
- Biotech and Pharma Strategy
- Duke University Hospital Project Course
- Health Policy & Management (Week in DC)
- Fuqua Client Consulting Practicum
- Provider Strategy
- Health Law and Policy
- Health Care Innovation & Entrepreneurship



HSM EMBA Curriculum

Executive MBA students complete four required courses and two electives.

EMBA courses are designed and delivered specifically for working professionals.



Required Courses (Must complete all four)

Health Institutions, Systems, and Policy (HSM Bootcamp) - HLTHMGMT 710:

See description above.

Health Care Markets - HLTHMGMT 711:

See description above.

Seminars in Health Care - HLTHMGMT 705 - 709:

See description above.

HSM Project Course - HLTHMGMT 897:

Capstone project that applies MBA skills and training to address a health sector business opportunity.

Elective Courses

See examples above. Please note, not all daytime elective courses are available to EMBA students.



For more information, visit www.fuqua.duke.edu

Health Sector Management

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