



COLLEGE OF
MANAGEMENT

PhD in Business Administration



Information Systems for Data Science Track

The Need for Advanced Study in the Field of Business

An understanding of business and organizations is central for knowledge creation about many phenomena in the social sciences. Studies of business shed light on vital processes such as: how labor and capital flow around the globe; how vast information systems are parsed to allocate resources, from R&D investment to health care; how the environment can be stewarded sustainably through multi-sector partnerships involving business, government, and NGOs; how the livelihoods and well-being of diverse populations will be secured in the future; and more. UMass Boston has expanded its role in knowledge creation with the advanced study of business to fully grasp many complex and vexing contemporary issues. Our PhD in Business Administration has three tracks: Organizations and Social Change, Finance, and Information Systems for Data Science.

Information Systems for Data Science

Data science, the study of extracting knowledge from data, encompasses statistics, data analytics, and information systems. The field is growing rapidly, creating a need for professionals who can use insights derived from big data to make effective business decisions. Data analytics has become a critical need in industries ranging from health care and financial services to marketing and government. Leveraging the strengths of the College of Management's faculty, the University of Massachusetts Boston is offering a cutting-edge and flexible doctoral program in this field.

As a newly instituted program, the PhD program at the MSIS department of UMass Boston started with a focus on information systems for data science. Positioned at the intersection of technology, business, and strategy, our program allows students to have a holistic view of data science and the role it plays in competition. Students will get exposed to a variety of state-of-art research streams in information systems and data science, with a relative focus on both data analytical techniques from a design science perspective and the application and management of data analytics in business settings from an organizational perspective. The program will offer students flexibility to investigate other topics they find interesting in data science and technology fields.

Who should apply?

All students with master degrees who are interested in data analytics are welcome to apply. Students with degrees in quantitative fields such as statistics, economics, math, computer science, management sciences, information systems, and other related disciplines are particularly encouraged to apply. A master degree in these related fields is a plus, although not required. Previous full-time working experiences in related positions are also a plus.

How will my learning experience impact organizations, society, and future global challenges?

Rapid increase in the amount of published data results in a data deluge that imposes significant challenges in data analytics. By offering a carefully tailored combination of courses in Information Technology, Applied Statistics, and Business Analytics, our Ph.D. program provides rigorous and in-depth courses of study with emphasis on various research methodologies, tools for data analytics, and relevant academic skill sets involving research design, literature review, theoretical development, empirical validation, and academic writing. Our program also provides students with extensive knowledge in the various emerging research areas in information systems (IS) field through IS research seminars and research collaboration opportunities with faculty members.

Academic advisers will help students configure a program of study which includes a rigorous sequence of courses in a variety of research methodologies, theories, and topics. Students will develop theoretical and methodological competencies in a variety of topics in the field of information systems and data science. Students will develop teaching competences through the teaching seminar, GA assignments to support a professor, and independently deliver courses. In addition to course work, students will actively engage in research with faculty members.

What kinds of research are faculty engaged in now?

The PhD program involves close, apprentice-like working relationships with faculty members, and students are introduced early to the world of conferences and publishing. A sampling of faculty projects includes:

- CyberSecurity Analytics for Massive Communication Graphs
- Home Healthcare Management for Dually Diagnosed Individuals with Mental and Physical Health Problems
- Characterizing managers' decision making patterns under uncertain and competitive environment
- Business intelligence as an IT-enabled agile and competitive business platform
- Social Media, Big Data, and Innovation: An Investigation of the Software Industry in India
- Data analytics through network optimization
- Strategic use of cloud computing and data assets for sustainable competitive advantage
- Decision modeling applications to areas such as technology development, policy, resource management.
- Abysmal behavior in Online Social Networks
- The role of health IT in hospital acquisitions
- Social influence on Bayesian learning process in post-adoption stage

What are the career opportunities for me when I graduate?

There are two main career opportunities for the individuals graduated from this program. They can pursue a career in academia as a faculty member or join an organization as a data scientist. In the first case, they can educate other data scientists and conduct state of the art research to be published in peer-reviewed journals.

For the second, students can become data scientists who use the acquired knowledge to excel the effectiveness of data collection and analytics in their organization and improve its competitiveness in today's economy.

The Curriculum – Information Systems for Data Science PhD

	Fall	Spring	Summer
Year 1	REQUIRED (CORE) BUSADM 700 - Business in Context: Markets, Technologies, Societies	REQUIRED (TRACK) BUSADM 741 – Information Systems Theory II	Qualifying Exam
	REQUIRED (TRACK) BUSADM 740 – Information Systems Theory I	REQUIRED (TRACK) BUSADM 743 – Decision Analysis	
	REQUIRED (TRACK) BUSADM 742 – Regression	REQUIRED (TRACK) BUSADM 745 – Multivariate Statistics	
	REQUIRED (TRACK) BUSADM 744 – Quantitative Research		
Year 2	REQUIRED (TRACK) BUSADM 780 - Advanced Data Mining and Predictive Modeling	REQUIRED (TRACK) BUSADM 785 – Big Data	Admission to Candidacy Exam & Proposal Defense Due
	REQUIRED (TRACK) BUSADM 782 – Optimization	REQUIRED (CORE) BUSADM 775 - Teaching and Professional Development	
	ELECTIVE • Elective course in topical area	ELECTIVE • Elective course in topical area	
	ELECTIVE • Elective course in topical area		
Year 3	REQUIRED BUSADM 899 Thesis Student teaches UG course	REQUIRED BUSADM 899 Thesis Student teaches UG course	PhD thesis defense—if ready
Year 4	REQUIRED BUSADM 899 Thesis	REQUIRED BUSADM 899 Thesis	PhD thesis defense due

Information Systems for Data Science Track PhD Courses

BUSADM 740 - Information Systems Theory I

This course is the first part of two-course series of Ph.D. seminars on classic literature of information systems. It is designed to provide doctoral students a broad introduction to various research issues and challenges in topics of information systems (IS) and information technology (IT) management. As the first one of this series, this course is focused on theories at the behavioral and group levels. Typical topics covered in the course include, but are not limited to, technology adoption and diffusion, IT-enabled communication, decision support, virtual teams, online community, cultural and power issues in IT activities, and other emerging topics in the research field.

BUSADM 741 - Information Systems Theory II

This course is the second part of two-course series of Ph.D. seminars on classic literature of information systems. It is designed to provide doctoral students specialized in information systems and business analytics a broad introduction to various research issues and challenges in topics of information systems (IS) and information technology (IT) management. As the second one of this series, this course is focused on theories at the organizational and economic levels. Topics covered include strategic IT planning, business value of IT, IT strategies, IT governance and controls, IT sourcing models, electronic marketplaces, economics of digital products, data science and business analytics, and other emerging topics in the research field.

BUSADM 742 - Regression

This course will introduce the fundamental concepts and applications of linear regressions, such as simple linear regression, multiple regression, model fit, transformations, variable selection and logistic regression etc., and also various issues that we might face during those applications. This course will be the foundation for applied quantitative research.

BUSADM 743 - Decision Analysis

Decision and risk analysis combine elements of probability, economics, logic, psychology and domain knowledge to characterize and analyze complex decision problems. Researchers in this scholarly discipline develop theoretical mathematical results, develop computational decision support tools grounded in formal theory, methods for populating models, as well as a large number of applied models for different real world problems or problem classes. There will be particular focus on connections between the approaches covered and developments in information systems and in analytics. Students emerging from the class will be prepared to incorporate decision analysis into research involving applications or IS/Analytics, or to further investigate decision analysis in order to research in the methods of the field itself. Students will also keep a journal of ideas one of which will be the basis for a project or research paper that has the potential for expansion into publishable results.

BUSADM 744 - Quantitative Research

This course focuses on understanding, evaluating, and designing quantitative methods and methodologies for information systems research. Through this course, students will review and exercise the basic skills required for quantitative research at the post-graduate level, including literature review, research design, data collection and analysis, and report writing. To gain hands-on experience, students will work on an original research project during the semester and will be expected to submit a research outcome to an IS journal or conference. This course will be especially helpful to students who wish to use the quantitative research methods (e.g., survey, experimental and/or quasi-experimental methods) in their dissertations and subsequent research endeavors.

BUSADM 745 - Multivariate Statistics

The goal of this course is to develop skills necessary in analyzing problems in which multiple variables are simultaneously present, without knowing beforehand which ones are playing important roles and hence are of interest, and which ones are not. Our main goal is to identify the signal or key features of the data. The course will cover the major techniques in this field. The focus will be on practical issues such as selecting the appropriate approach and how to prepare the data.

BUSADM 775: Teaching and Professional Development

As an advanced student of business, skills are needed to effectively and persuasively disseminate knowledge. This course will provide knowledge needed to engage an audience (with specific applications on teaching), giving professional presentations, and being persuasive on policy matters informed by research.

BUSADM 780 - Advanced Data Mining and Predictive Modeling

One of premiere challenges businesses face today is how to take advantage of the vast amounts of data they can easily collect. Data mining is used to find patterns and relationships in data, and is integral to business analytics and fact-based decision-making. This course covers current data mining techniques including algorithms for classification, association, and clustering; the course also covers text mining techniques such as Latent Semantic Analysis and Latent Dirichlet allocation. The techniques and approaches covered in this course will be examined in the context of current research and methodological use in the field of Information Systems.

BUSADM 782 – Optimization

This course teaches optimization theory and techniques that are powerful and important tools for conducting research in Data Science area. Optimization techniques can be used for mining and analytics of complex systems in Data Science field, which can greatly impact the decision making process in this area. This course covers mathematical programming techniques including linear

programming, integer programming, and network optimization; and emphasizes on how they can be applied to research problems. It focuses on effective formulation techniques, basic mathematical and algorithmic concepts, and software solution of large-scale problems arising in Data Science applications.

BUSADM 785 - Big Data

This course covers a new and increasingly popular method of conducting research using large scale data analysis. The advent of the Internet, Social Media and subsequently machine generated data has enabled social scientists to have access to extremely large datasets about the behavior of millions (or billions) of people or objects. However, collecting, storing, and analyzing this data isn't straightforward and requires specific skills.

The goal of this course is to help students gain the skills required for this type of research while exposing them to tools and big data research streams. The course will help students understand both the challenges and the opportunities and assist them to appreciate research related to Big Data.

BUS ADM 700: Business in Context: Markets, Technologies, Societies

In this course, students from across our tracks encounter the complex dilemmas in business today, which span business disciplines. They learn about the range of theoretical approaches and methods that can be mobilized to understand and address these dilemmas.

BUS ADM 775: Teaching and Professional Development Seminar

Students will work on having presence and engaging an audience, with specific applications to teaching, giving professional presentations, and being persuasive on policy matters informed by research. Students will develop a philosophy of teaching and prepare materials to enable them to start teaching undergraduates the next year.

BUS ADM 896: Independent Study

This course involves the comprehensive study of a particular topic in business administration under the direction of a faculty member. An independent study course can fulfill one elective requirement. A detailed proposal must be submitted to the faculty member prior to registration.

BUS ADM 897: Special Topics in Business Administration

This course provides an opportunity for presentation of current topics in business administration that do not fall under the purview of any other course.

BUS ADM 899: Dissertation Research (1 to 9 CR)

Research is conducted under supervision of the doctoral committee, leading to the presentation of a doctoral dissertation.

Why Choose UMass Boston?

UMass Boston is recognized as a world-class research university with a reputation for linking research to economic development and community well-being. The College of Management has been recognized by the Aspen Institute's Business & Society program as among the top 75 business schools in the world for leadership in researching and teaching about the social impacts of business. The location, breadth, and depth of University offerings, and faculty expertise, all offer doctoral students the chance to make a difference through their education.

Our Location

The College of Management at UMass Boston is centrally located in one of the world's premier cities for finance, technology, health care, social services, not-for-profits, consulting, and the arts. The opportunities for study, research, and outreach by doctoral students are in abundance in the Boston area. Students will be able to leverage relationships among faculty and industry leaders, while conducting their own research.

Our Faculty

Over a dozen dedicated faculty members are devoted to student learning in this track alone, with additional faculty serving in supporting roles. Faculty are leaders in their fields who regularly publish scholarly articles in top academic journals. Doctoral students will be paired with faculty advisors based on their area of interest. This intense mentorship program allows students to learn the crafts of research and teaching in a highly collaborative environment. Current faculty include:

Noushin Ashrafi

Professor of Management Information Systems

Professor Ashrafi's areas of expertise include object oriented system analysis and design, business analytics, health informatics, privacy and security in digital age. Her current research looks at the application of operations research and management science tools to measuring, controlling, and predicting reliability of conventional software; expert systems extension of software reliability studies to the problem of quality in software development; software process improvement; business agility; security and privacy issues in e-business; business intelligence; and healthcare informatics.

Ramakrishna Ayyagari

Associate Professor of Management Information Systems

Professor Ayyagari's research investigates the impact of IT on individuals and organizations.

Pratyush Bharati

Associate Professor of Management Information Systems

Professor Bharati's research interests are in: social media and big data, social media in organizations and society, green information systems, and international software services industry. He currently serves as the Senior Editor of The Data Base for Advances in Information Systems Journal, an Association for Computing Machinery (ACM) SIGMIS journal.

Roger Blake***Associate Professor of Management Information Systems***

Professor Blake's areas of expertise include object-oriented software development, databases, systems architecture, quantitative analysis, systems analysis and design. His research interests include data quality, data and text mining.

Romilla Chowdhuri***Assistant Professor of Management Information Systems***

Professor Chowdhuri's current research stream is influenced by the ubiquity of web 2.0 platforms that generate "social data" at an unprecedented level and the availability of novel data analytical tools and techniques. In particular, her research focuses on two interesting aspects of web 2.0 platforms. One, threats to the Identity and Privacy of web 2.0 users is real and unsettling. The prevention requires revealing the threats in the content and the structure of the social platforms and then systematically planning for the prevention of those threats. Two, there is a greater need to define the approaches and frameworks for the Big Data Integration for Decision-Making. Big Data is characterized by structured and unstructured data originating from the heterogeneous sources. Consequently, there arises a need for designing novel artifacts that integrate the heterogeneous data and thus provide insights for business or individual decision-making.

Kui Du***Assistant Professor of Management Science and Information Systems***

Professor Du primarily works at the intersection of information technology and strategic management. His overarching research interest is to understand how increasingly commoditized IT can still contribute to differential firm performance. Under this umbrella research question, he specialized in the role of IT during corporate transactions such as acquisitions, divestitures, alliances, and spin-offs. Some of his most recent work also focuses on the transforming role of IT in healthcare organizations. Most of his research projects leverage quantitative methods to analyze organization-level data.

Ehsan Elahi***Associate Professor of Management Science***

Professor Elahi's current research focuses on the behavioral aspects of managerial decision making in supply chain management. He intends to characterize decision making patterns when the decision makers face uncertainty and/or competitive environments. By using laboratory experiments to collect relatively large sets of data regarding how decision makers (subjects) act in practice, he tries to identify the reasons behind the gap between what theory predicts and how decision makers behave in practice.

Davood Golmohammadi***Associate Professor of Management Science***

Professor Golmohammadi's areas of expertise include lean manufacturing and Six Sigma, supply chain modeling and analysis, simulation modeling, and scheduling. His research interests include operations management, supply chain management, health care operations systems, and decision analysis.

Haijing Hao***Assistant Professor of Management Information Systems***

Professor Hao's research interests are to investigate how information systems impact healthcare, technology adoption in healthcare, Bayesian learning, online health community by using quantitative methods, econometrical modeling/statistical modeling.

Jeffery Keisler***Professor of Management Information Systems***

Professor Keisler's research focuses on decision analysis. Particular interests are: methods for estimating value of information and making uses of these estimates; combining different modeling tools; understanding and improving decision processes; decision making in resource allocation and portfolios.

Jonathan Kim***Assistant Professor of Management Information Systems***

Professor Kim's has three research streams: (1) Information Security, (2) Software Development, and (3) IT in Inter-organizational Networks. A research stream on information security focuses on how organizations protect their information systems. A research stream on software development focuses on how organizations can develop information systems more efficiently and effectively. A research stream on IT in inter-organizational networks focuses on how IT in inter-organizational networks can help organizations innovate and enhance productivity in a turbulent business environment.

Jean-Pierre Kuilboer***Associate Professor of Management Science and Information Systems***

Professor Kuilboer's areas of expertise include database design, object-oriented systems, e-commerce, data communications, and information systems security. His research interests include modern systems development methodologies, security, and performance.

Daniel Lee***Associate Professor of Management Information Systems***

Professor Lee's research and scholarly activities can be summarized as research on the role of information technology (IT) in agile organizations. Under this umbrella, I have conducted multiple research projects to answer the following few questions: (1) Using IT, how can firms create their dynamic capabilities, such as organizational agility, business intelligence, and knowledge management capability? and (2) How can firms or project teams manage dynamic risks in their global IT project and what is the role of IT in achieving their agile risk mitigations? In particular, I focus on some specific aspects of organizational IT for these research agenda, which include ambidextrous strategy of IT management (i.e., IT exploration and exploitation), business analytics as an agile IT infrastructure, and IT as a boundary object of organizational engagement.

Josephine Namayanja***Assistant Professor of Management Information Systems***

Professor Namayanja's primary area of research is in the area of Data Mining with applications in Cyber Security and Health Care Informatics.

Foad Mahdavi Pajouh***Assistant Professor of Management Information Systems***

Professor Pajouh's research interests are theoretical, computational and algorithmic optimization with applications in Big Data analytics of complex networks. Specifically, I am interested in applications of optimization in Business Analytics, Social Network Analysis, Financial Network Analysis and Energy Management.

Peng Xu***Associate Professor, Chair of Management Science and Information Systems***

Professor Xu's has two main research streams. In the first research, she investigates how IT capabilities and big data capability can transform business processes and improve business performance. In the second research stream, Dr. Xu investigates agility in business processes such as software development.

Wei Zhang***Associate Professor of Management Information Systems***

Professor Zhang's research interests include knowledge management, strategic use of IS/IT, and IS/IT education.

Program Costs:

The College of Management provides financial support for doctoral students in the form of a fellowship which includes an annual stipend of up to \$25,000 and remission of tuition and fees. In return for this support, the student serves as a research assistant for the first two years of the program, and as a teaching assistant when ready in later years. A student in good standing may receive an annual stipend for a maximum of three years.

Applying to the Program:

Applicants to the doctoral program should have a broad interest in information technology and data analytics. Applicants with backgrounds in statistics, economics, math, computer science, management sciences, information systems, and other related disciplines are particularly encouraged to apply. Most applicants will hold a master's degree, but exceptional students with only a first degree will be considered. Letters of recommendation, standardized test scores, and two essays are also required as part of the application. The program is selective and will admit approximately six students each year.

Admissions Requirements

Admission to the graduate programs in the College of Management at the University of Massachusetts Boston is selective and will produce a highly qualified cohort of graduate students.

Program website:

<https://business.umb.edu/doctoral-program/mis>

Application link:

<https://admissions.umb.edu/graduate-students/apply>

Once applications have been reviewed, the program's PhD Admissions Committee will schedule interviews with all finalists. Interviews are considered an important part of the application process. They may take place via telecommunication or on campus.

The application deadline is February 28, 2019 for a fall 2019 admission.

Contact Information:

For more information, please contact:

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