

MANAGEMENT SCIENCE AND INFORMATION SYSTEMS

Emerging technologies, the use of data analytics and artificial intelligence, and the critical need for understanding cybersecurity principles continues to dramatically alter our world.

The Department of Management Science and Information Systems (MSIS) is a national leader in providing high quality education in the areas of information systems, data science/data analytics, and cybersecurity. Our graduates are prepared for a variety of careers that regularly appear in the Top 20 fastest growing occupations as forecasted by the Bureau of Labor Statistics. Best of all – these skills and aptitudes prepare our graduates for the future workplace where technology, data science and cybersecurity will play even more important roles.

Our degrees are for problem solvers – those who want to learn how to use technology, data, artificial intelligence, machine learning, operations research, and other approaches to make processes, companies, and the world more effective and efficient.

The Department of Management Science and Information Systems offers two undergraduate majors – management information systems (MIS), and Data Analytics (DA). The MIS undergraduate degree has two possible options for students to specialize – one option in data science and another option in information assurance (IA). Note that information assurance is a National Security Agency (NSA) term for cybersecurity.

Additionally, the MSIS Department also offers graduate studies leading to master's degrees in management information systems (MIS), and a PhD degree in business administration with an option in MIS.

Management Information Systems (MIS)

The MIS degree focuses on the business applications of information systems. This includes emphasizing necessary skills required in the analysis, development, evaluation and implementation of various information and data-driven technologies critical for today's global organizations. The integration of information technology throughout all aspects of business coupled with the critical need for responsive information systems has created a strong demand for graduates in this area.

Beyond general education requirements and core business classes, the MIS major will take specialized courses in systems analysis and design, web development, database design and management, data science techniques and applications, data communications and cybersecurity, project management, among others.

The Data Science option for the MIS degree provides additional depth in quantitative tools that are critical in today's data-driven organization. This includes classes in visualization and descriptive, predictive, and prescriptive analytics.

The Information Assurance option for the MIS degree takes advantage of OSU's long-standing relationship with the NSA in providing hands-on classes in technical and managerial issues related to cybersecurity and information assurance.

Data Analytics (DA)

The Data Analytics degree provides an in-depth focus on the data related skills and analytic competencies needed to be a data analyst, a business

intelligence analyst and/or a data scientist. It is a much more specific degree and much more in-depth coverage of data and analytics than the MIS degree with a Data Science option.

Beyond general education requirements and core business classes, the Data Analytics major will take specialized courses in database design and management, data wrangling, visualization, and a variety of sophisticated data science techniques and applications including applied artificial intelligence and machine learning, among other electives that can come from other areas of analytics including supply chain analytics, marketing analytics, etc.

Undergraduate Certificates

To support students who are not majoring in MIS or Data Analytics but who want to gain a foundational set of expertise in various topics, the MSIS Department offers a series of certificates that range from 16 to 18 hours in length.

Cyber Systems – foundational cybersecurity classes.

Business Analytics – starting point for those interested in data analytics competencies.

Data Systems – the 'data wrangling' expertise portion of the data analytics degree.

Information Systems Development – Core competencies needed to build information systems.

Supply Chain Management – cross disciplinary courses related to another emerging area of importance in business, managing the supply chain.

Courses

MSIS 2103 Business Data Science Technologies

Description: The class focuses on problem solving with data analytics tools and technologies that are key to organization decision making. Emphasis is placed on decision making with spreadsheets and databases. Key information systems and cybersecurity concepts are also studied.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Undergraduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

MSIS 2203 Computer Programming for Business

Description: Problem solving and computer programming for business. Fundamental principles and constructs of programming. Fundamentals of a current applied business programming language.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Undergraduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

MSIS 2233 Business Analytics Fundamentals (A)**Prerequisites:** 3 hours of MATH or STAT with "A" designation.**Description:** Introduces the basic concepts of business and data analytics utilizing spreadsheets and visualization software. Topics will include a review of necessary business quantitative skills, applicable descriptive analytics measures, probabilistic decision-making and how to tell an "effective story" through the use of data and analytics tools. Previously offered as BADM 2233.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**General Education and other Course Attributes:** Analytical & Quant Thought**MSIS 3023 Technology, Diversity and Entrepreneurship****Description:** A study of technology, diversity and entrepreneurship. The use of technology as a research tool to study diversity and the opportunities available to diverse groups through entrepreneurship.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3103 End User Database Systems Design and Management****Prerequisites:** Non-MIS or CS or Business Analytics or Data Analytics or Accounting Systems majors only.**Description:** Principles and techniques of logical database design and related database concepts. Analysis, design and implementation of a database system using a relational DBMS. No credit for students in the MIS, Business Analytics, Data Analytics or Accounting Systems majors.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3153 International Telecommunications Business Environment****Description:** This course concentrates on understanding the implications and challenges of utilizing telecommunications networks in today's global business environment. Emphasis will be placed on identifying the major players in the global information infrastructure, standards setting bodies and procedures, and the various regulatory processes encountered. Students will research the telecommunications industry in other countries and develop comprehensive written reports. Course previously offered as TCOM 3153.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3163 Web Design Essentials****Description:** Web design principles including UX/UI, HTML/CSS, scripting, database management, and other relevant topics using the latest professional tools.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3203 Advanced Computer Programming for Business****Prerequisites:** MSIS 2203.**Description:** Advanced programming features are examined with an emphasis on the development of computer programs for business applications. Previously offered as MSIS 4203.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3223 Principles of Data Analytics****Prerequisites:** MSIS 2103 and (BADM 2233 or MATH 2103 or higher).**Description:** Problem solving with descriptive, predictive and prescriptive analytics in a business context using spreadsheets and other analytic tools. Techniques include forecasting, optimization, location analysis, decision analysis, inventory management, among others. Previously offered as MGMT 3223.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3233 Management Science - Prescriptive Analytics****Prerequisites:** MSIS 3223.**Description:** Prescriptive analytics applied to resource allocation and operational problems encountered in accounting, economics, finance, management and marketing. Linear programming, goal programming, integer programming, and network models.. Previously offered as MGMT 3233.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3243 Descriptive Analytics****Prerequisites:** MSIS 3223.**Description:** Application of descriptive analytics, especially from a "big data" perspective. Previously offered as MGMT 3243.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3253 Supply Chain Operations and Analytics****Prerequisites:** MSIS 3223.**Description:** Practical tools that support supply chain operations using relevant data and analytic models.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

MSIS 3293 Business Analytics Programming**Prerequisites:** MSIS 2103 or MSIS 2233.**Description:** Fundamental principles of programming for business analytics, with a focus on data wrangling concepts and tools.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3333 Database Systems Development****Prerequisites:** MIS or CS or Business Analytics or Data Analytics or Accounting Systems or MATH or STAT majors only.**Description:** Database design principles focusing on database modeling with hands-on creation, population and querying of transactional databases using SQL. Required for MIS majors. May not be used for degree credit with MSIS 5643. Course previously offered as MSIS 4013.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3363 Web Application Development****Prerequisites:** MSIS 2203 and MSIS 3333.**Description:** Develop web applications involving database development, user interface design, and asynchronous client-side programming.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3393 Advanced Spreadsheet Modeling and Programming****Prerequisites:** MSIS 2103 and permission of instructor.**Description:** This class provides students with advanced spreadsheet skills, including the ability to formulate math programming models, simulations, risk analysis, and other business decision-making tools. The class will also provide students with an introduction to spreadsheet programming (VB, macros, etc.), building decision support systems in spreadsheets, etc.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 3931 Diversity Impacts in Information Systems (D)****Description:** Critical analysis of the impact of technology on socially-defined classifications such as race, ethnicity, age, gender, sexuality, and disability; and how those groups affect technology industries. Through reading, observation, discussion, and writing; students will have their own perceptions challenged to better understand technology interaction through and with diverse populations, and how relationships between those groups may be improved or worsened as a result of mediated communications.**Credit hours:** 1**Contact hours:** Lecture: 1 Contact: 1**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**General Education and other Course Attributes:** Diversity**MSIS 4003 Systems Analysis and Design****Prerequisites:** MSIS 3363.**Description:** This course covers the core concepts and skills for developing software in an organizational context, including agile software development techniques, as well as the socio-cultural aspects of the systems analysis and design process. May not be used for degree credit with MSIS 5653. Course previously offered as MSIS 3303 and MGMT 3033.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4010 Applied Analytics and Information System Studies****Prerequisites:** MIS and data analytics majors only, or departmental permission.**Description:** Structured internship, field study or independent project with supporting academic study. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.**Credit hours:** 1-6**Contact hours:** Contact: 1-6 Other: 1-6**Levels:** Undergraduate**Schedule types:** Independent Study**Department/School:** Mgmt Sci & Info Sys**MSIS 4020 Applications Software Tools and Techniques****Prerequisites:** Permission of instructor and/or department.**Description:** Hands-on experience with selected software-based tool or programming languages such as SAP, SQL, PERT/CPM, etc. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.**Credit hours:** 1-3**Contact hours:** Lecture: 1-3 Contact: 1-3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4033 Information Systems Project Management and Communication****Description:** This class discusses the multi-faceted dimensions critical to successfully leading information systems projects. Topics will include behavioral, strategic, technical, quantitative and communications issues faced by those directing projects. May not be used for degree credit with MSIS 5033. Course previously offered as MSIS 3033.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4053 Supply Chain Security and Risk Analysis****Description:** This course examines the threats and vulnerabilities to an organization's supply chain and identifying controls that can be used to mitigate such threats. Physical and cyber will be examined.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

MSIS 4111 Technology Success Skills Application**Prerequisites:** MIS or data analytics majors only.**Description:** Advanced professional development and networking for information systems and analytics students.**Credit hours:** 1**Contact hours:** Lecture: 1 Contact: 1**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4123 Cybersecurity Systems Management****Description:** A broad investigation of the elements of cybersecurity with an emphasis on the management impact and risk assessment and mitigation for all types of information and privacy threats to corporations and businesses. May not be used for degree credit with MSIS 5213. Previously offered as MSIS 3123, MSIS 4223 and MGMT 4223.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4133 Information Technologies for Electronic Commerce****Prerequisites:** MSIS 4003.**Description:** The Internet and web-based technologies, systems and applications that allow organizations to overcome the barriers of time and distance for conducting commerce. Scripting and markup languages, web programming tools, and the connectivity technologies for designing and developing electronic commerce and systems.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4153 Supply Chain Systems and Technologies****Description:** This course covers the underpinning technologies, systems, platforms and models that enable the design, management and control of digitally connected supply chains.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4233 Applied Information Systems Security****Prerequisites:** MSIS 4123, MSIS 4523.**Description:** An investigation into the various technical aspects of attacking and guarding against attacks and failures in various types of information systems. Course content may vary but will generally include computer, network, and data protection technologies (e.g. firewalls, packet filters, proxy servers, user authentication and validation techniques, encryption, backup methodologies, system and component redundancies, etc.). Various threats and attack methods will be examined. May not be used for degree credit with MSIS 5233.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4243 Digital Forensics and Incident Response****Prerequisites:** MSIS 4123.**Description:** Procedures for identification, preservation and extraction of electronic evidence. Provides an understanding of underlying theory and strategy of investigations. May not be used for degree credit with MSIS 5243.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4253 System Certification and Accreditation****Prerequisites:** MSIS 4123.**Description:** Introduction to the certification and accreditation process. Risk analysis, system security analysis, and other topics. Previously offered as MGMT 4253. May not be used for degree credit with MSIS 5253.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4263 Business Intelligence and Predictive Analytics****Description:** Applied knowledge management tools and techniques for organizational decision support. Predictive analytics, machine learning, and other emerging techniques.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4273 Legal and Ethical Issues in Information Systems****Description:** Reviews the current status of information systems law in regard to rights of privacy, freedom of information, confidentiality, work product protection, copyright, security, legal liability, ethical issues, and a range of additional legal and information policy topics. Investigates the legal difficulties that technological innovations are causing in all of these areas. Legal options for dealing with the conflicts caused by technological change and likely adaptations of the law over time in response to societal changes will be explored. May not be used for degree credit with MSIS 5273.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4283 Operating Systems for Information Assurance****Description:** Operating Systems (OS) concepts for security. Vulnerabilities and threats. Security models. User authentication. Smart cards: architectures, technologies, application environments, and case studies. System availability. Software and data integrity. Auditing. Sensitive data confidentiality. Access control. Secure OS development: design principles, design methodologies, security certification. Case studies: Unix/Linux, MS/Windows XP/2000.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

MSIS 4333 Data Wrangling**Prerequisites:** MSIS 3293 and MSIS 3333.**Description:** Advanced data wrangling skills relevant to the data science field. This includes the use of advanced data structures, data cleaning and outlier detection, webscraping, the use of API's, and the inclusion of XML and RDMS files, among other topics.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4363 Advanced Application Development****Prerequisites:** MSIS 4003 and MSIS 3363.**Description:** Managing the software development pipeline. Topics include creating build/release pipelines for continuous integration/deployment, containerizing applications and emerging DevOps topics.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4373 Advanced Topics in Management Information Systems****Prerequisites:** Senior standing and consent of instructor.**Description:** Current and emerging advanced topics in the field of management information systems. Advanced network management, advanced electronic commerce issues, international management information systems and legal and regulatory issues in telecommunications.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4443 Advanced Topics in Analytics and Artificial Intelligence****Description:** Emerging topics in analytics, including simulation, business dynamics, blockchain/cryptocurrency, artificial intelligence, supply chain, among others. Previously offered as MGMT 4443.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4523 Infrastructure Development****Description:** Broad coverage of network types and protocols used to drive the diverse voice, video and data needs of today's business. Network vocabulary and the understanding of how telecommunications components function are stressed. May not be used for degree credit with MSIS 5203. Previously offered as MGMT 4523.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4623 Data Science Programming****Prerequisites:** MSIS 3293**Description:** Programming concepts and applications for data science, analytics, and business intelligence. May not be used for degree credit with MSIS 5193.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4673 Data Visualization****Description:** This course will provide an understanding of the role of descriptive analytics, visualization, and dashboarding in direct support of managerial decision making (business intelligence and analytics). May not be used for degree credit with MSIS 5673.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4713 Scripting Essentials****Description:** Application of scripting languages (e.g. BASH, PowerShell, Python) for general business, data and information assurance solutions. May not be used for degree credit with MSIS 5713.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 4943 Sports Management Analytics****Description:** Useful decision tools such as analytics, visualization, optimization, decision analysis, forecasting and simulation are used to address decisions faced by sports administrators and decisions made during sporting contests. Current 'hot' issues in sports decision-making will also be examined.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5020 Advanced Applications Software Tools****Description:** Advanced hands-on experience with selected software-based tool or programming languages such SAP, SQL, PERT/CPM, etc. For graduate credit only. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.**Credit hours:** 1-3**Contact hours:** Lecture: 1-3 Contact: 1-3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5033 Information Systems Project Management**Prerequisites:** Graduate standing.**Description:** This class covers the important multi-faceted dimensions of directing and leading information systems projects. Topics will include behavioral, strategic, technical and quantitative issues faced by information system project teams. May not be used for degree credit with MSIS 4033.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5123 Enterprise Resource Planning****Prerequisites:** Admission to a graduate program.**Description:** Challenges of data integration and redesign of processes in organizations. Introduction to enterprise resource planning (ERP) concepts, software, and practices. ERP issues architecture, planning, design, implementation, and project management. Extensions of ERP Technologies for managing supply chains and customer relationships. Emerging trends.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5133 Advanced Web Based Application Development****Prerequisites:** Graduate standing and MSIS 5643 or equivalent.**Description:** Development of n-tier web-based applications, including concepts and technologies relating to the presentation, business, and data tiers. Technologies include (but are not limited to) browser and other client programming, server-side programming, data tier programming and XML technologies.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5193 Programming for Data Science and Analytics I****Prerequisites:** Graduate standing and computer programming proficiency, or consent of instructor.**Description:** Programming concepts and applications for data science, analytics, and business intelligence covering data manipulation, data derivation, web content mining, visualization, text mining, and other topics. May not be used for degree credit with MSIS 4623.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5203 Advanced Infrastructure Development****Description:** Broad coverage of the underlying infrastructure necessary for information systems operation. Understanding and experience with essential network connectivity as well as server and service architecture to support information systems is emphasized. May not be used for degree credit with MSIS 4523.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5213 Cybersecurity Systems Management****Description:** A broad investigation of the elements of cybersecurity with an emphasis on the management impact and risk assessment and mitigation for all types of information and privacy threats to businesses. Course previously offered as TCOM 5223. May not be used for degree credit with MSIS 4123.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5223 Programming for Data Science and Analytics II****Prerequisites:** MSIS 5193 and graduate standing.**Description:** Programming concepts and applications for data science, analytics, and business intelligence.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5233 Applied Information Systems Security****Prerequisites:** MSIS 5213 and MSIS 5203.**Description:** An investigation into the various technical aspects of attacking, and of guarding against attacks and failures in various types of information systems. Course content may vary but includes computer, network, and data protection technologies (e.g., firewalls, packet filters, proxy servers, user authentication and validation techniques, encryption, backup methodologies, system and component redundancies, etc.). Various threats and attack methods examined. May not be used for degree credit with MSIS 4233.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5243 Information Technology Forensics and Incident Response****Description:** Review of systems for vulnerabilities and analysis of systems that have been breached including incident response. May not be used for degree credit with MSIS 4243. Course previously offered as TCOM 5243.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

MSIS 5253 Advanced System Certification and Accreditation**Prerequisites:** MSIS 5213.**Description:** Preparing information systems for operational status requires significant planning and sound execution. Covers the key components of the certification and accreditation process, including risk assessment and mitigation, system security analysis, controls and system documentation. May not be used for degree credit with MSIS 4253. Course previously offered as TCOM 5253.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5263 Information Assurance Offense****Prerequisites:** MSIS 5233 and graduate coordinator permission.**Description:** Learning successful computer attacks so as to recognize and apply appropriate security controls for system vulnerabilities.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5273 Legal and Ethical Issues in Information Technology****Description:** This course reviews the current status of information systems law in regard to rights of privacy, freedom of information, confidentiality, work product protection, copyright, security, legal liability, ethical issues and a range of additional legal and information policy topics. May not be used for degree credit with MSIS 4273. Course previously offered as TCOM 5273.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5283 Secure Information Systems Administration****Prerequisites:** MSIS 5213 and MSIS 5773 and graduate coordinator permission.**Description:** Introduction to basic concepts and technologies relevant to secure information systems administration. The topics covered in this course include, but are not limited to, operating system (OS) hardening, securing servers, network protection, and various access control mechanisms.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5293 Information Assurance Capstone****Prerequisites:** Final semester in program; graduate coordinator permission.**Description:** This capstone course takes a strategic view of corporate information assurance. The goal is to provide an overarching view of an information assurance program to include physical, personnel, operational, and cyber security, including the underlying legislation and Federal and state regulations that drive corporate IA programs and policy.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5303 Prescriptive Analytics****Prerequisites:** Admission to a SSB graduate program.**Description:** Application of prescriptive analytic techniques to business problems. Some descriptive analytics may also be covered.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5313 Supply Chain Analytics****Prerequisites:** Graduate standing.**Description:** Introduction to supply chain analytics including forecasting, scheduling, inventory, distribution, site selection, and other analytical tools and techniques.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5393 Advanced Spreadsheet Modeling****Description:** Advanced spreadsheet modeling skills critical to business problem solving. Presentation, analysis, solution and communication facets are emphasized.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5410 Advanced Topics in Information Assurance****Prerequisites:** Graduate standing and consent of program director.**Description:** Advanced topics in information assurance and security. Course previously offered as TCOM 5410. Offered for fixed credit, 3 credit hours.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

MSIS 5413 Advanced Data Science Applications**Prerequisites:** Graduate standing and permission of instructor.**Description:** Special topics with an emphasis on emerging tools and techniques in the broad field of data science.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5503 Statistics for Data Science****Prerequisites:** Graduate standing.**Description:** Data Science focuses on the analysis of large secondary data sets. This course focuses on understanding and applying statistical models and techniques to obtain useful information from large data sets. These techniques are part of supervised statistical machine learning.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5600 Special Projects in Business Information Systems****Prerequisites:** Consent of MS in MIS director.**Description:** Study of advanced topics not covered directly in other classes or directed study under the supervision of a faculty member. Offered for variable credit, 1-12 credit hours, maximum of 12 credit hours.**Credit hours:** 1-12**Contact hours:** Contact: 1-12 Other: 1-12**Levels:** Graduate**Schedule types:** Independent Study**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5613 Advanced Supply Chain Analytics****Prerequisites:** MSIS 5313.**Description:** Advanced tools and analytic techniques used in the supply chain field.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5623 Information and Network Technology Management****Prerequisites:** Admission to a SSB graduate program or consent of MBA director.**Description:** Major principles and impact of information technology from a manager's perspective in relation to the operation and success of businesses in today's global digital economy. Topics include the Internet, networks and wireless systems, database management systems, decision support systems, social media and e-business applications.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5633 Predictive Analytics Technologies****Prerequisites:** Graduate standing.**Description:** A comprehensive analysis of contemporary business intelligence tools and techniques used in managerial decision-making, including decision support systems, data and text mining, knowledge management, expert systems, neural networks, and other tools and techniques.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.**MSIS 5643 Graduate Database Management****Prerequisites:** Graduate standing.**Description:** Practical foundations of database systems. Current and emerging issues in the database field. May not be used for degree credit with MSIS 3333.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5653 Advanced Systems Analysis and Design****Prerequisites:** Graduate standing.**Description:** Systems thinking. Systems life cycle, modeling approaches, methods, tools, and techniques of systems analysis and design for the development of modern organizational information systems. May not be used for degree credit with MSIS 4003.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 5663 Advanced Data Wrangling****Description:** Provides an introduction of the major activities involved in data engineering. These activities include understanding fundamental principles and concepts, design principles, and prototype development to include table definitions, ETL logic, and example report definitions.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**Additional Fees:** Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5673 Descriptive Analytics and Visualization

Description: This course will provide an understanding of the role of descriptive analytics, visualization, and dashboarding in direct support of managerial decision making (business intelligence and analytics). Specifically, knowledge about managerial decision making, business intelligence, analytics, decision support systems and how they relate to other types of information systems; knowledge about human visual processing in relation to data presentation; knowledge of dashboard design and management; and knowledge about software packages and hands-on capabilities. May not be used for degree credit with MSIS 4673.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

Additional Fees: Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5683 Advanced Analytics Technologies

Description: Project-based study of advanced application of analytic and data wrangling/data engineering type tools for large scale systems. Cannot be used for Degree credit with CS 6583.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

MSIS 5693 Digital Transformation Strategy

Prerequisites: Graduate standing.

Description: This course covers a variety of practical and timely managerial and technical challenges faced by organizations as the new digital society and workplace continues to evolve.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

Additional Fees: Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5713 Scripting Essentials

Description: Application of scripting languages (e.g. BASH, PowerShell, Python) for general business, data and information assurance solutions. May not be used for degree credit with MSIS 4713.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

Additional Fees: Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5773 The Upper Layers of Telecommunications Systems

Description: This course is designed to develop a solid and deep understanding of data/telecommunications networks. The course covers various technical components and their functions in today's communication networks, with a special focus on the upper layers of the TCP/IP protocol suite (i.e., Network, Transport, and Application). The topics covered in the course will include, but not be limited to IP packet delivery, forwarding, and routing, UDP and TCP, dynamic host configuration (DHCP), domain name (DNS) lookup, and other widely used Internet applications (e.g., Web and email). Course previously offered as TCOM 5123.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

MSIS 5793 Business Applications of Artificial Intelligence

Prerequisites: Graduate Standing.

Description: Project-based study of advanced practical business applications of Artificial Intelligence.

Credit hours: 3

Contact hours: Lecture: 3 Contact: 3

Levels: Graduate

Schedule types: Lecture

Department/School: Mgmt Sci & Info Sys

MSIS 5900 Practicum in Management Information Systems

Prerequisites: Consent of director of and admission to the MS in MIS program.

Description: Application of MIS-related methods and skills in a business environment. Integration of knowledge through real-world problem solving situations in organizational contexts. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.

Credit hours: 1-6

Contact hours: Contact: 1-6 Other: 1-6

Levels: Graduate

Schedule types: Independent Study

Department/School: Mgmt Sci & Info Sys

Additional Fees: Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5950 Advanced Practicum

Prerequisites: Consent of director of and admission to the MS in MIS program.

Description: Application of MIS-related methods and skills in a business environment beyond the normal practicum/internship timeframe. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.

Credit hours: 1-6

Contact hours: Contact: 1-6 Other: 1-6

Levels: Graduate

Schedule types: Independent Study

Department/School: Mgmt Sci & Info Sys

Additional Fees: Business Graduate Program fee of \$6 per credit hour applies.

MSIS 5990 Directed Studies in Information Assurance**Prerequisites:** Graduate standing and consent of program director.**Description:** Special advanced topics, projects and independent study in information assurance and security. Course previously offered as TCOM 5990. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.**Credit hours:** 1-6**Contact hours:** Lecture: 1-6 Contact: 1-6**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6200 Advanced Topics in Management Information Systems****Prerequisites:** Doctoral student status and consent of instructor.**Description:** Special advanced topics in management information systems for doctoral students. Offered for variable credit, 3-6 credit hours, maximum of 12 credit hours.**Credit hours:** 3-6**Contact hours:** Contact: 3-6 Other: 3-6**Levels:** Graduate**Schedule types:** Independent Study**Department/School:** Mgmt Sci & Info Sys**MSIS 6300 Contemporary Topics in MSIS Research****Prerequisites:** Doctoral standing.**Description:** In depth study in one or more topics in MSIS field. An ongoing conversation about major issues in the field. Topics related to any one of the areas within the broad, interdisciplinary field of management science and information systems, such as management information systems, management science, telecommunications, and operations management. Offered for variable credit, 1-12 credit hours, maximum of 12 credit hours.**Credit hours:** 1-12**Contact hours:** Lecture: 1-12 Contact: 1-12**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6303 Overview of Information Systems Research****Prerequisites:** Doctoral Standing.**Description:** The purpose of this seminar is to become familiar with research streams and domains within Information Systems including theory, methods, paradigms, and various perspectives. Students will develop critical thinking and logical reasoning skills, as well as oral and written communication.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6313 Privacy and Security Research in Information Systems****Prerequisites:** Doctoral Standing.**Description:** The purpose of this seminar is to develop an understanding of the research domains of privacy and security in Information Systems. Potential topics covered include conceptualization of concepts (e.g. intention vs. behavior, traits and states), contextual influences (e.g. e-commerce, healthcare, social media, data breaches), and methods (e.g. behavioral economic vs. hypothetical).**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6323 Seminar on Qualitative and Mixed-Methods Research****Prerequisites:** Doctoral Standing.**Description:** The purpose of this seminar is to provide an introduction to qualitative and mixed methods and their use in scholarly research. Drawing upon well regarded courses by top IS scholars, the course balances understanding qualitative research with the application of that understanding to business research. Within a seminar class format, this course develops skills in designing, evaluating, and understanding qualitative research methods.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6333 Overview of MSIS Research****Prerequisites:** Doctoral standing.**Description:** Recent research studies that fall within the broad, interdisciplinary field of management science and information systems. An introduction to the academic "way of life", focusing on research productivity.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6343 Advanced Methods in MSIS Research****Prerequisites:** Doctoral standing.**Description:** Development of advanced methodological skills necessary to carry out research in the chosen area of study within the field of MSIS. Skills related to any one of the areas within the broad, interdisciplinary field of management science and information systems, such as management information systems, management science, telecommunications, and operations management. Same course as BADM 6343.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys**MSIS 6353 Seminar in Data Analytics****Prerequisites:** Doctoral Standing.**Description:** The objective of this course is for the PhD student to develop an in-depth understanding and appreciation of business analytics and data science as viable research streams.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Mgmt Sci & Info Sys

Undergraduate Programs

- Data Analytics, BSBA (<http://catalog.okstate.edu/spears-business/management-science-information-systems/data-analytics-bsba/>)
- Management Information Systems, BSBA (<http://catalog.okstate.edu/spears-business/management-science-information-systems/bsba/>)
- Management Information Systems: Data Science, BSBA (<http://catalog.okstate.edu/spears-business/management-science-information-systems/data-science-bsba/>)

- Management Information Systems: Information Assurance, BSBA (<http://catalog.okstate.edu/spears-business/management-science-information-systems/information-assurance-bsba/>)

Graduate Programs

The Department of Management Science and Information Systems also offers courses that lead to the completion of the Master of Business Administration (MBA), the Master of Science in management information systems (MIS) and the Doctor of Philosophy in business administration (PhD).

The Master of Business Administration (MBA) Degree

(See "Business Administration (<http://catalog.okstate.edu/spears-business/watson-graduate-school/>).")

The Master of Science in Management Information Systems (MIS) Degree

This degree program combines strong practical concepts with intense hands-on instruction, helping graduates not only to understand business processes and the concepts behind the information systems they work with, but also develop, modify, use, and protect these rapidly changing computing systems through their technical expertise.

The MS in MIS is a 30 hour program featuring a core of 21 hours, including a business practicum. Admission requirements for the MS in MIS are like the admission requirements for the other master's programs in the Spears School of Business. Information about the program is available on the Internet at <https://go.okstate.edu/graduate-academics/programs/masters/management-information-systems-and-information-assurance-ms.html>.

Graduate Certificate in Health Analytics

There is a dire need for professionals with practical knowledge and skills in health analytics—ones who can convert large data repositories into actionable insight for better decisions to enhance effectiveness and efficiency in the ever more complex and highly competitive health care domain. OSU's internationally ranked MS in MIS program has collaborated with the Center of Health Sciences' MS in Health Care Administration (HCA) program and the Center of Health Systems Integration (CHSI) research center focused on the intersection of health, healthcare, informatics and analytics/data sciences to create a new, unique interdisciplinary program – a Certificate in Health Analytics.

The program requires taking four courses (each three credit hours, totaling 12 credit hours) of coursework. This certificate program allows for the courses to double-count toward a master's degree and this certificate degree.

The Doctor of Philosophy (PhD) Degree

The PhD in business administration program administered through the Department of Management Science and Information Systems provides intensive study in the general field of management information systems (including specialties in areas such as data science, cybersecurity, etc.). The program prepares the student for significant professional contributions in university teaching and research.

The program is flexible and individually structured to meet the needs and objectives of the candidate. Emphasis is placed on understanding the

analytical and theoretical foundations of the MIS field, applications in the depth area of specialization and development of research capabilities in the discipline.

Competence in planning and executing research must be demonstrated in a dissertation. In addition, each candidate must pass a series of comprehensive qualifying examinations, written and oral, and a separate, final oral examination of the dissertation. To enhance teaching skills, all PhD students in residence are required to teach on a quarter-time or half-time basis for at least one semester while earning the degree.

Outstanding students with master's degrees in any field of study may apply. The application for admission to the program is evaluated based on the following:

1. undergraduate and graduate grade-point averages,
2. the score on the Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
3. TOEFL score for international applicants,
4. a two- or three-page statement describing goals and academic interests,
5. three letters of recommendation,
6. evidence of research potential, and
7. a personal interview when feasible.

Minors

- Data Science (DS), Minor (<http://catalog.okstate.edu/spears-business/management-science-information-systems/data-science-minor/>)
- Information Assurance (IA), Minor (<http://catalog.okstate.edu/spears-business/management-science-information-systems/information-assurance-minor/>)
- Management Information Systems (MIS), Minor (<http://catalog.okstate.edu/spears-business/management-science-information-systems/management-information-systems-minor/>)

Certificates

- Business Analytics, UCRT (<http://catalog.okstate.edu/spears-business/management-science-information-systems/business-analytics-ucrt/>)
- Cyber Systems, UCRT (<http://catalog.okstate.edu/spears-business/management-science-information-systems/cyber-systems-ucrt/>)
- Data Systems, UCRT (<http://catalog.okstate.edu/spears-business/management-science-information-systems/data-systems-ucrt/>)
- Information Systems Development, UCRT (<http://catalog.okstate.edu/spears-business/management-science-information-systems/information-systems-development-ucrt/>)
- Supply Chain Management, UCRT (<http://catalog.okstate.edu/spears-business/management-science-information-systems/supply-chain-management-ucrt/>)

Faculty

Rick L. Wilson, PhD—Professor and Head

Regents Professors: Dursun Delen, PhD; Ramesh Sharda, PhD

Professors: Ali Amiri, PhD; Rathin Sarathy, PhD; Mark Weiser, PhD

Associate Professors: Corey Baham, PhD; David P. Biros, PhD; Jin Kyu Lee, PhD; Xiao Luo, PhD; Andy Luse, PhD

Assistant Professors: Chenzhang Bao, PhD; Wenting (Kayla) Jiang, PhD; Xuecheng (Ethan) Yin, PhD

Professors of Professional Practice: Ali Bagheri, PhD; Shoumen Bardhan, MBA; James Burkman, PhD; Evan Davis, PhD; Jason Morgan, MS; Kim Strom, MBA

Other Faculty: Gabe Bahr, PhD; Bradford Cary, MS