Information Systems (BS)

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THE PROGRAM
A prime distinction between a good company and a great company is how well its information systems align with business goals. The CUNY SPS online B.S. in Information Systems degree program focuses on five components of information systems: processes, people, data, infrastructure, and design; and on the ways they combine to create agile and competitive organizations. The online B.S. in Information Systems program provides students with the practical knowledge to make sense of and contribute to the increasingly globalized and technology-driven business environment. The program's online classes make it one of the most convenient IS degree options for working professionals and transfer students looking to complete their bachelor's degree. And, as always, we provide the value, quality, and recognition that come with a CUNY degree.

Students in the B.S. in Information Systems program:
- Develop core technical proficiency in programming, web and mobile app development, database design and management, enterprise applications and cloud computing, systems analysis and design, and networking and security
- Customize the curriculum through a broad range of technical and application electives such as e-commerce, human resources, marketing, GIS, healthcare systems, computer forensics, data science, and business process redesign
- Learn practical and high-demand skills through hands-on projects in every course
- Cultivate a strong sense of innovation and entrepreneurship through courses in technology strategy and management as well as by developing their technology portfolio

The B.S. in Information Systems program's core curriculum is based on industry guidelines set by the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS), and allows students to select one of two tracks: 1) General IS and 2) Management Information Systems (MIS). Online students who elect the general track can customize their own sequence of elective and context courses based on their specific career goals and personal passions. Context courses - a sequence of four thematically related classes - offer information systems students the opportunity to apply technology to an industry or discipline of their choice. Alternatively, students who participate in the MIS track follow a highly structured sequence of elective and context courses that focus on the most IS-intensive functions found in today's business and government environments: logistics, supply chain management, data analytics, accounting, human resources, marketing, and e-commerce.

Career and Academic Advancement Prospects
Graduates of the B.S. in Information Systems program will be prepared for a variety of jobs, including systems analyst and developer, web and mobile application programmer, business analyst, database analyst & administrator, computer and information system manager, project manager, business intelligence analyst, network administrator, IT auditor, and desktop support.

Program Requirements
120 credits are required for the online Bachelor's Degree in Information Systems.
- General Education - 39 credits required.
- 63 credits in the Major, as follows:
  - 39 credits of core requirements
  - 12 credits from the track of the student's choosing
  - 12 credits of context courses*
- 18 credits from electives from the Information Systems curriculum or courses in other degree program.

*Context Courses are a way of organizing major electives to allow students to apply their technology expertise to a specific industry or field.

Required Courses
- IS 200 - Foundations of Information Systems
- IS 210 - Software Application Programming 1
- IS 211 - Software Application Programming 2
- IS 250 - Computer and Network Security
- IS 260 - Networks and Business Data Communication
- IS 300 - Enterprise Architectures and Applications
- IS 320 - Systems Analysis and Design
- IS 350 - IS Strategy, Management, and Acquisition
- IS 362 - Data Acquisition and Management
- IS 361 - Database Architecture and Programming
- IS 499 - IS Capstone
- MATH 215 - Introduction to Statistics
- PROM 210 - Project Management

Elective Courses
- DSAB 245 - Universal Design and Assistive Technology
- IS 310 - Web Programming and Mobile App Development
- IS 311 - Introduction to Data Science
- IS 325 - Computer Forensics
- IS 326 - E-Commerce for Information Systems
- IS 330 - Logistics and Supply Chain Management
- IS 332 - Social Media
- IS 339 - Health Information Technology
- IS 349 - IS Independent Study (1-3 cr)
- IS 369 - IS Internship (1-3 cr)
- IS 370 - Human-Computer Interaction
- IS 374 - Business Process Design and Workflow Analysis
- IS 379 - IS Special Topics
- IS 380 - Geographic Information Systems
- IS 410 - Principles of Informatics
- MATH 315 - Discrete Mathematics and Linear Algebra

Tracks
Students select one of the following three tracks:

General Track (Design Your Own Program)
Required Track Courses:
- IS 205 - IT Infrastructure and Support
- IS Electives: Students select any nine credits of Information Systems elective courses based on their own interests.
- Context Courses: Students may take any 12 credits from a coherent grouping in a specific field that best fits each students' interests. Advisors and faculty will be available to assist with forming the group of courses.

MIS Track
Required Track Courses:
- IS 311 - Introduction to Data Science
- IS 326 - E-Commerce for Information Systems
- IS 374 - Business Process Design and Workflow Analysis
- MATH 315 - Discrete Mathematics and Linear Algebra
Context Courses - Students pick 4 of 5:
- BUS 305 Accounting Fundamentals
- BUS 306 - Managerial Accounting*
- BUS 315 - Principles of Marketing
- BUS 321 - Human Resource Management

- IS 330 - Logistics and Supply Chain Management

*Students who opt for Managerial Accounting must take BUS 305 as a prerequisite

MINOR IN INFORMATION SYSTEMS

The minor in Information Systems (IS) provides non-IS majors with the opportunity to develop valuable exposure to key areas of technology. It is a flexible, four-course minor designed to give students an opportunity to select IS courses in line with their professional goals. To earn the IS minor, all students take IS 200 Foundations of Information Systems, a course designed to help students gain a thorough grasp of the technology landscape and to develop their own perspective on the role of information systems in organizations and society. Students then select three additional IS courses—with the exception of the IS Internship and Capstone— that are in line with their own professional and academic aspirations. To view course offerings, visit: http://sps.cuny.edu/programs/bs_is/curriculum .

Minor Requirements
- IS 200 - Foundations of Information Systems – 3 credits
- Three courses from the following options – 9 credits
  Choose three additional IS courses that form a coherent learning experience that is in line with the student's professional aspirations. The IS internship and Capstone courses are not included in the mix.

COURSE DESCRIPTIONS

BUS 305   **Accounting Fundamentals**   **3 Credits**
Prerequisite: Any 200-level Math Course
This course provides the fundamentals for the identification, measurement, and reporting of financial and economic events of enterprises and businesses. The accounting concepts and standards studied will be used in conjunction with accounting software, and focuses on such topics as assets, liabilities, the accounting cycle, inventory, internal controls, accounting receivables, cash flow statements, financial statements and corporate accounting.

BUS 306   **Managerial Accounting**   **3 Credits**
Prerequisite: BUS 305
Organizations use accounting information for planning and controlling operations. Students develop a framework for measuring managerial performance through an analytical treatment of cost behavior under dynamic conditions by employing tools such as job and process costing and forecasting, operational budgeting and forecasting, activity-based costing, variable costing, cost estimation, cost-volume-profit analysis, balance sheets, cash flow, standard costing, differential costing, capital planning and projections, and variance analysis.

BUS 315   **Principles of Marketing**   **3 Credits**
Prerequisite: None
This survey course explores the various environments in which contemporary marketers operate, including the online digital world of e-marketing, and the problems and practices related to the planning of marketing strategies in the exchange process. Students learn how successful marketers focus on domestic and global market opportunities while being sensitive to cultural differences, including ethical and socially responsible decision-making, while focusing on issues of quality and technological change.

BUS 321   **Human Resource Management**   **3 Credits**
Prerequisite: None
Human Resources Management (HRM) bridges policies that impact human behavior with those that drive business strategy to make the most of an organization's human capital. HRM includes the functions of recruitment and selection, employment law, training, career development, labor relations, equal employment opportunity (EEO), affirmative action, performance management, health and safety, compensation, and benefits management. Through exposure to a broad range of topics, students are prepared to deal with a variety of issues that may be encountered in careers such as that of an HR manager or team leader. An overview of HR Information Systems is included.

DSAB 245   **Universal Design and Assistive Technology**

Prerequisite: None

This course examines the key issues framing access, opportunity, and physical inclusion for children and adults with disabilities, including veterans. The course will include an exploration of principles of universal design, reasonable accommodations in housing, education and employment, and the process of determining accommodation needs, the role of technology in enhancing access to the built environment and education, and the challenges of providing accommodation for hidden disabilities.

IS 200   **Foundations of Information Systems**   **3 Credits**

Prerequisite: None

Information systems (IS) are an integral part of all business and organizational activities. This course introduces students to contemporary information systems, demonstrates how these systems are used throughout global organizations, and motivates students to think critically about these systems, in order to develop a holistic perspective on technology and its applications. The focus is on the key components of information systems—people, software, hardware, data, and communication technologies—and how these components can be integrated and managed to create competitive advantage. Students gain an understanding of how information is used in organizations and how information systems enable an organization to improve the delivery of its goods or services with regard to quality, speed, or agility. Also provided is an introduction to systems and development concepts, technology acquisition, and new and emerging application software. Students gain hands-on experience with stock and trade technologies, such as spreadsheets and databases. Several case studies are analyzed to learn how IS systems are used in various domains.

IS 205   **IT Infrastructure and Support**   **3 Credits**

Prerequisite: None

Computer system downtime raises the costs of doing business and lowers productivity. For technology vendors, good customer support is a driver of sales. This introductory course builds on the foundational skills needed by computer desktop support personnel. A particular emphasis is placed on helping the student to build the technical skills required to take the CompTIA A+ certification exams, which include the ability to install, build, upgrade, repair, configure, optimize, and maintain computer and mobile systems. The course also prepares students to support popular software applications. Designed for individuals with minimal technical understanding of computer hardware, software, networks, processes, and portable devices, students learn these essentials for helpdesk management. Simulations are used to provide hands-on experience.

IS 210   **Software Application Programming I**   **3 Credits**

Prerequisite: None

The ability to write software programs is a critical skill in the IS field. Students are introduced to the fundamental concepts and terms of computer science that are necessary to program software, with an emphasis on problem-solving and algorithm development. Concepts such as data types, control structures, modular organization, and object-oriented programming, using practical examples that highlight the design, implementation, and testing phases of programming, are explained. Important topics such as program documentation, input/output considerations, and information assurance are stressed. Students build several well-documented and well-designed integratable code modules to present in class.

IS 211   **Software Application Programming 2**   **3 Credits**

Prerequisite: IS 210

This second course in programming further develops the skills gained in Software Application Programming 1 by incorporating object-oriented programming calls into functional and procedural code. Design is discussed in depth, and students are introduced to Graphical User Interface (GUI) applications and arrays. Additional programming topics include file input/output, inheritance, polymorphism, text processing, and wrapper classes. For the final project, students will create and present a working and deployed application that adheres to coding best practices and includes complete documentation.

IS 250   **Computer Network Security**   **3 Credits**

Prerequisite: IS 200 (or BUS 325 and CIS 101)

In an increasingly networked world, computer security, which consists of the practices and policies intended to prevent and monitor unauthorized access, misuse, modification, or denial of a computer or network, is more critical than ever. This introductory course provides a general overview of various computer and network security topics and concepts, including standards and protocols, cryptography, network- and infrastructure-level security, authentication and remote access considerations, securing wireless networks, identifying tools for security management and threat abatement, the role of change management, user security awareness, business continuity planning, privacy rights, and security, legal issues and

challenges, and computer forensics. Students explore fundamental concepts associated with security planning and design, security risk analysis and mitigation, and security operational considerations. Particular emphasis is placed on understanding methods and techniques for risk assessment and risk mitigation.

IS 260   **Networks and Business Data Communication**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Networks allow for the exchange of data between individual computing devices. Students are introduced to the underlying technology upon which information systems are built and become familiar with the fundamental concepts of networking and telecommunications and how these technologies can be used to enhance business performance. Particular emphasis is placed on convergence technologies, such as multimedia communications and Voice-Over-Internet Protocol, and the role of networks in the facilitation of these real-time applications. The technologies behind wireless and broadband networks are discussed. Additional topics include voice and data network design, monitoring tools and various network features (e.g., quality of service). Case studies are used to expose students to real-world scenarios.

IS 300   **Enterprise Architectures and Applications**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Enterprise architecture exists at the intersection of technology and business strategy and consists of the vision, principles, and standards that guide the purchase and deployment of technology within an enterprise. Students explore the design, selection, implementation, and management of enterprise-wide IT solutions. Frameworks and strategies for infrastructure management, system administration, data/information architecture, content management, distributed computing, middleware, legacy system integration, system consolidation, software selection, IT investment analysis, and total cost of ownership calculation are discussed. Students examine multiple types of IS functions, such as messaging and collaboration systems, business intelligence and analytics systems, customer relationship management (CRM) systems, enterprise resource planning (ERP) systems, and content management (CM) systems. Cloud computing, a widely used architecture to deploy enterprise applications as a service over the Internet, is also included. Case studies are employed to expose students to real-world scenarios.

IS 310   **Web Programming and Mobile App Development**   **3 Credits**
Prerequisite: IS 211
One of today's fastest growing software markets is the mobile web, where portable devices interface with web applications to transact business, connect friends, and control machines. This course is designed to explore the core principles and techniques essential to building both websites and mobile applications. Interface design techniques that enhance existing websites for mobile viewing, how to incorporate markup and style sheet capabilities, and automating sites with scripting languages are covered. Specific platforms and programming techniques change over time, but the expectation is that students build working and deployable systems that may be displayed on contemporary web and mobile platforms. Security, performance, scalability, and maintainability are also discussed.

IS 311   **Introduction to Data Science**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101), MATH 315, IS 211, HIM 361
The ability to understand, analyze, and interpret large and disparate data sets is increasingly important for gaining competitive advantage in the marketplace, and improving social conditions. This course uses the statistical and mathematical techniques that form the basis of descriptive and predictive analytics to extract qualitative insights from a variety of data types (e.g., customer preferences, purchasing and pricing, social network interactions, text, images, and mobile and ubiquitous outputs). Using existing programming and data management skills students apply them to the areas of data acquisition and cleaning, data exploration and visualization, mathematical model development, and graphical report creation. Areas of application can include social analytics, search engine algorithms, recommender systems, market analysis and demand estimation, customer segmentation and product pricing, healthcare, and transportation. In addition, students use current statistical analysis tools such as R., Case studies are used throughout the course.

IS 320   **Systems Analysis and Design**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
The science of systems analysis and design requires IS professional to map and exploit the processes, methods, techniques, and tools that organizations use to conduct business. This course covers a systematic methodology for analyzing a business problem or opportunity, determining what role, if any, computer-based technologies can play in addressing the business need, articulating business requirements for the technology solution, specifying alternative approaches to acquiring the technology capabilities needed to address the business requirements—in particular, in-house

development, development from third-party providers, or purchased commercial off-the-shelf (COTS) packages—and specifying the requirements for the information systems solution. Students gain hands-on experience with systems analysis and design methodologies and tools by analyzing the functionality and design of existing systems with regard to a specific business need, and developing requirements and a project plan for a new system.

IS 325　　　　　　　**Computer Forensics**　　　　　　　**3 Credits**
Prerequisite: IS 205, IS 362, IS 260, IS 250
Computer and digital forensics is the science of recovering and investigating digital evidence from technology. In this course, students build on a broad technical knowledge of computer systems to study phenomena such as computer crimes, hacking, producing evidence, and fraud investigation. Topics include Windows Registry Analysis, recovering deleted files, and Solid State Drives (SSD) operations versus Hard Disk Drive (HDD) functions. The limitations of forensic analysis are also covered. Upon completion of the course, students have a basic knowledge of computer forensics concepts, chain of custody/evidence handling, and computer forensic tools. Case studies are used to expose students to real-world scenarios.

IS 326　　　　　　　**E-Commerce for Information Systems**　　　　　　　**3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
The Internet and an assortment of information technologies have led to the development and continuing evolution of electronic commerce (e-commerce), which has revolutionized the way people, organizations, and governments interact with each other. This course approaches the study of e-commerce strategies, operations, workflows, and technologies from a value-creating perspective. Through lectures, case studies, and hands-on projects, students develop an understanding of the special characteristics that identify the similarities and differences between e-commerce and other forms of commerce, such as hybridized models. Students develop a conceptual foundation to help them identify and evaluate new trends, innovative business opportunities, and the potential impacts to various industries, as well as the fundamental technological structures required for implementation. In addition, students learn to assess the potential limitations, issues, and risks associated with various e-commerce initiatives. For IS majors, students must produce an e-commerce solution, either using off-the-shelf tools or by coding a complete solution.

IS 330　　　　　　　**Logistics and Supply Chain Management**　　　　　　　**3 Credits**
Prerequisite: None
Logistics—processes within a single firm or organization—and supply chain management (SCM)—processes and exchanges across multiple organizations are essential elements of any lean business. The course discusses the efficient and effective planning and control of product/service design and generation; raw and finished goods inventories; layout and location of offices, warehouses, and factories; distribution channels and systems; labor standards and scheduling; intermediate and long-term decision making; and fulfillment of critical customer expectations. Topics include logistics/SCM strategy and tactics; process selection; design and analysis; location selection; scheduling and sequencing; lean operating systems; quality control; facility and work design; performance measurement; simulation, queuing, and supply chain models; project, inventory, and capacity planning; and related professional software packages.

IS 332　　　　　　　**Social Media**　　　　　　　**3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Social media, and more generally, social computing, bring people together in virtual spaces to facilitate various kinds of technology-mediated social participation, such as connecting, discussing, artifact and information sharing, and recommending. Understanding the applications and platforms that are available today—such as social networking, virtual communities, artifact and knowledge-sharing sites, mobile and location-based technologies/services, video, blogs, wikis, etc.—is critical for recognizing emergent trends in this rapidly changing space. Topics examined include the impact of social media and modern communication tools on areas such as commerce, entertainment, networking and relationship building/maintenance, community action, sustainability, national security, emergency management, healthcare, citizen science, and education. Students discuss phenomena such as crowdsourcing, recommender systems, and collaboratories. To better understand the social aspects of online interaction, core behavioral concepts, including group and community formation and identification, social network theory, individual motivations, and trust, in addition to basic media theories such as social presence and media richness are discussed. Designed for IS majors, everyone must create an online community, using either off-the-shelf tools or by creating an original one.

IS 339   **Health Information Technology**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Information systems hold great promise for improving healthcare quality and lowering skyrocketing healthcare costs. From applying best practices in information systems to challenges in health information technology (HIT), students are prepared to enter the health technology field. Topics include an introduction to HIT standards, health-related data structures, and software applications and enterprise architecture in healthcare and public health organizations. The workflow and processes embedded in the healthcare industry are discussed in depth. Patient privacy and security are a critical part of this course. Considerable time is spent exposing students to emerging trends in healthcare technologies, such as scanning and imaging devices that produce data. Case studies are included to ensure that students have a broad exposure to technology in healthcare. Students gain hands-on experience with open source HIT systems.

IS 349   **IS Independent Study**   **1-3 Credits**
Prerequisite: Approval of the program's academic director.
Students have the flexibility to learn more about a topic of interest outside of the formal course setting. A subject is chosen in consultation with a faculty advisor, who acts as the student's supervisor, and with the permission of the academic director. Requirements include the submission of a course contract describing the course of study and its specific learning objectives. Course credit is determined by the instructor, with the approval of the academic director.

IS 350   **IS Strategy, Management, and Acquisition**   **3 Credits**
Prerequisite: IS 211, HIM 361, IS 260, IS 250, IS 320, IS 300
One distinction between a good company and a great company is how well its information systems (IS) enable organizational capabilities. From a senior management perspective, we explore the acquisition, development, and implementation of plans and policies to achieve efficient and effective information systems. Students learn the fundamental concepts associated with high-level IS infrastructure and the systems that support the operational, administrative, and strategic needs of an organization. Through the use of case studies, students begin to develop an intellectual framework to critically assess IS infrastructures and emerging technologies, and how these enabling technologies might affect organizational strategy. The ideas developed and cultivated are intended to provide an enduring perspective that can help students make sense of an increasingly globalized and technology-intensive business environment.

IS 362   **Data Acquisition and Management (Undergraduate)**   **3 Credits**
Prerequisite: IS 210 and IS 361
In a world where more and more data of increasing complexity and scope is being collected by organizations of all types, the ability to organize and manage this data is the first step toward extracting value from it. Students are introduced to key topics and techniques associated with database management, including the difference between data and information from a data-centric point of view; managing data with and without databases; computer and data security; data cleansing, fusing, and processing techniques; combining data from different sources/integration; storage techniques, including very large data sets; and database privacy and security issues. Hands-on experience is critical throughout. Students are required to build several databases by importing, cleaning, manipulating, storing, and securing complex datasets that contain multiple types of data. An emphasis on applying critical thinking and creativity to the design of efficient and effective management solutions is necessary.

IS 361   **Database Architecture and Programming**   **3 Credits**
Prerequisite: None
This course discusses the design, development, deployment, and evaluation of database systems. In addition, students learn conceptual and relational data modeling, and implementation languages such as Structured Query Language (SQL). Additional topics include data integrity, relational normalization theory, security, privacy, and concurrence control.

IS 369   **IS Internship**   **1-3 Credits**
Prerequisite: Approval of the program's academic director.
This is an off-campus internship supervised by a staff person at the internship site, and overseen by a faculty advisor. The internship site must be approved by the program's academic director, and the overall duration of the work must be no less than 150 hours of student work. At the start of the internship, the student and faculty advisor jointly develop specific learning objectives tailored to the nature of the internship. Over the course of the internship, students are required to submit weekly reflections. When the internship ends, students submit a final paper that illustrates the knowledge gained from the experience.

IS 370   **Human-Computer Interaction**   **3 Credits**
Prerequisite: IS 211
User-friendly design is a key driver of the rapid adoption and continued use of software systems. Human-Computer Interaction (HCI) is an interdisciplinary field that studies the design, evaluation, and implementation of computer user interfaces (UX). HCI integrates cognitive psychology, design, and computer science among other disciplines to better understand the factors that influence technology's usability and acceptance. This course examines methods (e.g., design thinking), techniques (e.g., user-centered design), and tools used in the design and evaluation of information systems, as well as the human performance that results from good design. Societal impacts of HCI, such as accessibility, are also discussed. Case studies are used to expose students to real-world scenarios. Students produce and present a semester-long project.

IS 374   **Business Process Design and Workflow Analysis**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
The analysis and design of business processes is critical to improving quality and efficiencies. Moreover, identifying process and workflow are the first steps to sourcing or building software systems. This course provides an introduction to business process design and workflow analysis, as both a management discipline and as a set of enabling technologies. Students learn the key concepts, terms, methodologies, techniques, and technologies in business process design. Hands-on experience with process modeling tools and technologies used to support workflow analysis is provided. Students learn the practices and technologies that are making "process thinking" a new approach to solving business problems and continuously improving organizational competitiveness and performance. A semester-long project using open source process design tools is developed and presented at the end of the course. Case studies are used to expose students to real-world scenarios. (e.g., McDonald Brothers case study).

IS 379   **IS Special Topics**   **3 Credits**
Prerequisite: Approval of the program's academic director.
This course provides the program to offer boutique short-term courses on emerging phenomena and technologies in this fast-moving industry. The expectation is that this is an advanced class that requires an appropriate student project and deliverable in line with the number of credits awarded for the course.

IS 380   **Geographic Information Systems**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Modern Geographic Information Systems (GIS) have found their way into many aspects of everyday life, nested as they are on smartphones and PDAs and installed in automobiles. GIS applications are broad, from operations and logistics to marketing and sales. In our personal lives, GIS is. These technologies allow users, from individuals to organizations, to visualize, question, analyze, and interpret the world and its underlying geographical processes. Students learn about the hardware, software, and processes incorporated into GIS. Various methods for interpreting and analyzing spatial data, including cartography, remote sensing, spatial statistics, and survey research are included. Case studies are used to expose students to real-world scenarios. Students also gain hands-on experience using open-source GIS platforms.

IS 410   **Principles of Informatics**   **3 Credits**
Prerequisite: IS 200 (or BUS 325 and CIS 101)
Informatics places the study of information systems into a human context. Information systems professionals need to understand human behavior as it shapes, and is shaped by, a confluence of information made available through technology. Key ethical and legal issues that arise in computer-driven environments, including the ownership, use, and sharing of electronic information; protection of the rights of information producers, providers, and users; protection of minors; protection of privacy; harassment; ADA compliance; and the role of government are discussed. Additionally, there is an examination of human attitudes toward, and usage of hardware and software in, the global environment. Students consider specific applications of the course content to their specialized fields of study (e.g., business information systems, health information systems, educational technologies, etc.).

IS 499   **IS Capstone**   **3 Credits**
Prerequisite: Senior status and permission from the program's academic director.
Synthesizing complex information and applying that information in the context of a real-world scenario is a high-level ability that employers increasingly demand. In this course, students integrate the skills developed in previous classes into a comprehensive body of knowledge to provide tangible evidence of their competence. The Capstone has two components: 1.) submission of a portfolio that consists of work completed during the program presented in a holistic manner, and 2.) development of a final IS project with emphasis on one or two areas of the profession, and grounded in a particular real-

world context. For the project, a problem is identified, then analyzed, designed, and implemented with a professional-quality information system that contributes to a solution. In addition, students must be able to articulate the value of and practical challenges associated with the IS solution. Students may work either independently or in a group (no larger than three, with the permission of the instructor), selecting a subject that is in line with the student's career aspirations, and ideally builds on ideas and work that began in other classes. The work developed in the Capstone is presented to faculty and students, and the larger information systems community.

MATH 215   **Introduction to Statistics**   **3 Credits**
Prerequisite: None
Introduces the basic principles of statistics and probability, with an emphasis on understanding the underlying concepts, real-world applications, and the underlying story that the numbers tell. Uses Microsoft Excel's statistical functions to analyze data. Provides an introduction to probability, descriptive statistics, hypothesis testing, and inferential statistics.

MATH 315   **Discrete Mathematics and Linear Algebra**   **3 Credits**
Prerequisite: MATH 215 or BUS 310
Computational mathematics—including discrete math and linear algebra—provide the foundation for modeling real-world phenomena such as consumer behavior, web trends, traffic, crime, and clinical success rates. Students learn the basic mathematics that is needed for programming and entry-level data science. Throughout the course, students have a chance to apply mathematical theory to real-world data sets and gain an understanding of the relationship between discrete mathematics and IS. Topics include logic, set theory, functions and sequences, algorithms and integers, counting, graphs, definitions, isomorphism, graph algorithms, trees, basic probability, matrix algebra, systems of linear equations, eigenvalues, eigenvectors, recurrence relations, and linear programming.

PROM 210   **Project Management**   **3 Credits**
Prerequisite: CIS 101 or IS 200
Students learn to plan, organize, lead, and evaluate projects—large and small—to ensure that requirements are delivered on time and within budget. Topics include the essentials of initiating a project, defining requirements, scheduling tasks, managing scope, working in cross-functional teams, communicating effectively, resolving conflict, and closing a project. While budget development is beyond the scope of this course, students will be expected to understand simple project budgets. In addition to traditional task lists and timelines, students must generate project charters, change notices, progress reports, and project closing documents.