INFORMATION SCIENCE AND TECHNOLOGY

Information science and technology (IS&T) offers an M.S. degree program. Information technology has transformed every aspect of our economy and society. Rapid spread of technology has generated the need for highly trained professionals to implement and maintain information systems. The M.S. in information science and technology is designed to educate students in the design, development, and successful application of information systems in organizations.

Also offered are a number of graduate certificates:

- Business analytics and data science
- Business intelligence
- Business project management
- Cybersecurity and information assurance management
- Digital media and web design
- Digital supply chain management
- Electronic and social commerce
- Enterprise resource planning
- Entrepreneurship and technological innovation
- Finance
- Financial technology
- Human-computer interaction and user experience
- Information systems project management
- Management and leadership
- Mobile business and technology

These graduate certificates are intended for students who wish to specialize and for working professionals who want to stay ahead of rapidly changing technology. Each graduate certificate program consists of a four-course sequence from existing graduate-level courses. Certificate credits earned by students admitted to the M.S. program will count toward their master's degree. Students admitted just to the certificate program will have non-matriculated status. However, if they complete the four-course sequence with a grade of "B" or better in each of the courses taken, they will be admitted to the M.S. program if they so choose. In addition, successful completion of the graduate certificate offered in the business program, with grades of "B" or better in each of the courses will also enable admission to the IS&T M.S. program. Admitted students must still meet the admissions requirements relative to undergraduate coursework prerequisites.

The faculty is active in studying the design and application of the web and has external support for research. Research experiences are integrated into the classroom experience. Specially equipped research laboratories are available to support studies in human-computer interaction and experiments with computer networks, as are general purpose computing laboratories that are available to all students. A large number of computing languages and special-purpose software tools are available on various platforms. While instruction and research are on the leading edge of information systems, the department endeavors to keep class sizes small to facilitate student and faculty interactions.

Financial Assistance

Financial assistance is available to graduate students in the form of assistantships and fellowships. Research opportunities for advanced students exist. For application forms, contact the department.

Additional Information

Contact us at 573-341-7216, bit@mst.edu or visit http://bit.mst.edu.

Admission Requirements

In addition to the requirements set by the office of admissions and the office of graduate studies, specific requirements for admission to the M.S. in information science and technology (thesis or non-thesis) are as follows:

- Successful completion of an undergraduate degree from a recognized college or university with a GPA (grade point average or international equivalent) of 3.0/4.0 or better.
- Submission of scores from the Graduate Record Exam (GRE) or the Graduate Management Admissions Test (GMAT).
- TOEFL or IELTS scores must be submitted if English is not the candidate's natural language.
- Undergraduate coursework in Calculus; Statistics; Object-oriented Programming with Data Structures; Information Systems; Relational Database Management Systems; and Computer Architecture must be shown.

***Please note that meeting the above requirements does not guarantee admission into the M.S. in information science and technology, but, rather, is used by the admissions committee in the decision-making process.***

Degree Requirements

M.S. with thesis: The M.S. degree with thesis requires the completion of 24 hours of graduate course work (5000-level or above), 6 hours of research, and the successful completion and defense of a research thesis.

M.S. without thesis: The M.S. degree without thesis requires the completion of 30 hours of graduate course work (5000-level and above). Courses below the 5000-level will not count toward the M.S. degree, even if they are taken to fulfill prerequisites.

The following core courses are required of all M.S. students in information science and technology. These courses are designated to ensure that all IS&T masters students study the four information systems perspectives of networks and web design, human perception, application implementation, and organizational systems.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>IS&amp;T 5251</td>
<td>Technological Innovation Management and Leadership</td>
</tr>
<tr>
<td>IS&amp;T 5885</td>
<td>Human-Computer Interaction</td>
</tr>
<tr>
<td>IS&amp;T 6261</td>
<td>Advanced Information Systems Project Management</td>
</tr>
<tr>
<td>IS&amp;T 6336</td>
<td>Foundations of Internet Computing</td>
</tr>
</tbody>
</table>

The department of business and information technology offers a variety of graduate certificates. Each certificate program consists of four courses and is open to persons holding a bachelor's, master's or Ph.D. degree in areas such as business, social sciences, technology, engineering, or related disciplines who have the required pre-requisites for the courses in the program. A student must maintain an average cumulative grade point of 3.0 or better on a 4.0 scale in the certificate courses in order to receive the graduate certificate.

Students may apply to be admitted only to a graduate certificate program. If admitted, the student will have non-degree graduate status.
but will earn graduate credit for the courses completed. If a student completes the four graduate certificate courses with a grade of B or better in each of the courses taken, the student may be admitted to the master of business administration or to the master of science in information science and technology if the student so chooses. A student must, however, follow the normal application process and meet the undergraduate coursework prerequisites. The graduate certificate credits will count toward the student’s MBA or M.S. degree.

Details about some of the graduate certificates are listed below; others are listed in the business administration section of the catalog.

**AI, Machine Learning and Automation in Business**

Artificial Intelligence is a disruptive technology in the business realm with transformational impact. From detecting malware and preventing money laundering to automating insurance claims and optimizing inventory and improving product recommendations and more, AI will continue to necessitate changes in core business processes and models. Within the past few years, machine learning, while not fully tapped in the business sphere, has become more effective and widely utilized. Tomorrow’s leaders and managers will need to integrate machine learning where appropriate, incorporating its capabilities with those of humans. The design and implementation of new combinations of technologies with human skills to meet customers’ needs will require critical thinking skills, creativity, and project planning.

A student admitted to this graduate certificate must complete four courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>BUS 5730</td>
<td>Machine Learning and Artificial Intelligence for Business</td>
</tr>
<tr>
<td>IS&amp;T 5535</td>
<td>Machine Learning Algorithms and Applications</td>
</tr>
<tr>
<td>BUS 6723</td>
<td>Artificial Intelligence, Robotics, and Information Systems Management</td>
</tr>
<tr>
<td>IS&amp;T 5520</td>
<td>Data Science and Machine Learning with Python</td>
</tr>
<tr>
<td>IS&amp;T 6443</td>
<td>Database Marketing</td>
</tr>
<tr>
<td>IS&amp;T 6445</td>
<td>Database Marketing</td>
</tr>
</tbody>
</table>

And two of the following:

<table>
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<tbody>
<tr>
<td>ERP 5110</td>
<td>Performance Dashboard, Scorecard and Data Visualization</td>
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<tr>
<td>ERP 6610</td>
<td>Advanced Customer Relationship Management in ERP Environment</td>
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<td>Data Modeling &amp; Visualization Prototyping for Enterprise Decision Dashboards</td>
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<td>BUS 6425</td>
<td>Supply Chain and Project Management</td>
</tr>
</tbody>
</table>

**Business Analytics and Data Science**

Data analytics facilitates realization of objectives by identifying trends, creating predictive models for forecasting, and optimizing business processes for enhanced performance. Three main categories of analytics are:

- **Descriptive** - the use of data to find out what happened in the past.
- **Predictive** - the use of data to find out what could happen in the future.
- **Prescriptive** - the use of data to prescribe the best course of action for the future.

Big data is an emerging phenomenon. Computing systems today are generating 15 petabytes of new information every day—eight times more than the combined information in all the libraries in the U.S.; about 80% of the data generated every day is textual and unstructured data.

This graduate certificate is one of three graduate certificates offered by cooperating departments at Missouri S&T to fulfill the needs in the area described as “big data.” The other two graduate certificates are:

- **Big Data and Security**
- **Big Data Management and Analytics**

A student admitted to this graduate certificate must complete four courses:

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>IS&amp;T 5420</td>
<td>Business Analytics and Data Science</td>
</tr>
<tr>
<td>IS&amp;T 6450</td>
<td>Information Visualization</td>
</tr>
<tr>
<td>ERP 5410</td>
<td>Use of Business Intelligence</td>
</tr>
<tr>
<td>COMP SCI 5204</td>
<td>Regression Analysis</td>
</tr>
<tr>
<td>COMP SCI 5402</td>
<td>Introduction to Data Mining</td>
</tr>
<tr>
<td>COMP SCI 6304</td>
<td>Cloud Computing and Big Data Management</td>
</tr>
<tr>
<td>COMP ENG 6330</td>
<td>Clustering Algorithms</td>
</tr>
<tr>
<td>STAT 5814</td>
<td>Applied Time Series Analysis</td>
</tr>
</tbody>
</table>

And one course from the following:

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>IS&amp;T 6443</td>
<td>Essentials of Data Warehouses</td>
</tr>
<tr>
<td>IS&amp;T 6445</td>
<td>Database Marketing</td>
</tr>
<tr>
<td>IS&amp;T 6448</td>
<td>Building the Data Warehouse</td>
</tr>
<tr>
<td>IS&amp;T 6887</td>
<td>Research Methods in Business and IS&amp;T</td>
</tr>
<tr>
<td>ERP 5210</td>
<td>Performance Dashboard, Scorecard and Data Visualization</td>
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<tr>
<td>ERP 6610</td>
<td>Advanced Customer Relationship Management in ERP Environment</td>
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<td>BUS 6425</td>
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**Business Intelligence**

Interest in business intelligence has been a recent strong theme among employers. Medium and large-sized businesses are especially interested. In order to make appropriate decisions, upper-level administration of an organization needs to draw data together from different systems in order to get a unified picture of the status and performance of an organization and present it in helpful ways. Examples include the development of organizational scorecards, dashboards, and other tools that provide a picture of how an organization is performing. People capable of creating and maintaining such information are needed.

This graduate certificate focuses on the technologies that allow an organization to make effective business decisions based on operational data pulled together from many different sources inside and organization. The target audience consists of any individual who would manage any type of IT professionals, database administrators, business analysts, and any person who would need to understand the technologies and their capabilities.

A student admitted to this graduate certificate must complete four courses:

<table>
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<th>Course</th>
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<tr>
<td>ERP 5410</td>
<td>Use of Business Intelligence</td>
</tr>
<tr>
<td>IS&amp;T 6444</td>
<td>Essentials of Data Warehouses</td>
</tr>
<tr>
<td>ERP 5410</td>
<td>Enterprise Resource Planning Systems Design and Implementation</td>
</tr>
<tr>
<td>ERP 6444</td>
<td>Performance Dashboard, Scorecard and Data Visualization</td>
</tr>
<tr>
<td>ERP 6610</td>
<td>Advanced Customer Relationship Management in ERP Environment</td>
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<tr>
<td>ERP 6220</td>
<td>Data Modeling &amp; Visualization Prototyping for Enterprise Decision Dashboards</td>
</tr>
</tbody>
</table>
Cybersecurity and Information Assurance Management

Cybersecurity is one of the fastest growing employment segments in IT. As technology grows and progresses, with our devices and lives becoming more and more interconnected, the challenges of cybersecurity and information assurance will continue to grow. This presents a career to those with the necessary skills that will be exciting, rewarding, fast-paced, and highly sought after.

A student admitted to this graduate certificate must complete four courses:

- IS&T 5910: Privacy and Information Security Law
- IS&T 6780: Adv Human and Organizational Factors in Cybersecurity
- Two courses from the following list:
  - ERP 5240: Enterprise Application Development and Software Security
  - IS&T 6335: Mobile Technology for Business
  - IS&T 6336: Foundations of Internet Computing
  - IS&T 6641: Advanced Digital Commerce and the Internet of Things

Digital Media and Web Design

Digital media is growing as consumers change the way they access information. In pursuing this certificate, students will acquire the skills and knowledge to create, design, and analyze digital media. The focus will be on the media itself, the social/digital network that connects these media, the interfaces that connect these media with users, and the application of these skills in business and other creative contexts. Thus this certificate program will address the pressing demand and opportunities for graduates with advanced knowledge and skills in areas such as networked communication and marketing, web-based media creation and design, and methods for designing and building effective human-media interfaces.

A student admitted to this graduate certificate must complete four courses:

- IS&T 6654: Advanced Web and Digital Media Development
- Two courses from the following list:
  - IS&T 5885: Human-Computer Interaction
  - IS&T 6680: Advanced Web and New Media Studies
  - MKT 5310: Digital Marketing and Promotions
- One course from the following:
  - IS&T 5652: Advanced Web Development
  - IS&T 5886: Prototyping Human-Computer Interactions

Digital Supply Chain Management

Success in today’s marketplace requires that organizations deliver products and services that provide easily identified value for their customers. This certificate draws on strengths within two departments to integrate source (strategic procurement and supply management), production (manufacturing and service operations), and delivery processes (demand fulfillment), with a focus on the use of information technologies as the critical enabler of supply chain efficiencies and responsiveness.

The certificate is designed to give students the tools and ideas that help shape and define the various components of value creation. Students can gain knowledge and skills in the full spectrum of supply chain activities: supplier relationships, purchasing management, operations and inventory management, logistics and transportation, quality management, and information technology.

A student admitted to this graduate certificate must complete four courses:

- IS&T 6445: Database Marketing
- IS&T 6440: Database Marketing
- One course from the following list:
  - MKT 6580: Marketing Management
  - BUS 6425: Supply Chain and Project Management

Electronic and Social Commerce

Social commerce is just one sub-set of e-commerce, however it is growing rapidly. The department of business and information technology (BIT) has leveraged its’ strengths in both business and technology for this program, which is designed to create successful students by developing skills in technological business practices that will provide opportunities for succeeding in today’s fast paced world. To that end, the program focuses on the following competencies:

- Management concepts applied to IT
- Management concepts applied to support of electronic commerce
- Use of business processes in IT integration
- Competitive advantage through IT
- Electronic commerce through collaborative shopping

A student admitted to this graduate certificate must complete four courses:

- IS&T 6641: Advanced Digital Commerce and the Internet of Things
- One course from the following:
  - IS&T 5515: Technological Innovation Management and Leadership
  - BUS 6723: Artificial Intelligence, Robotics, and Information Systems Management
- Two courses from the following list:
  - IS&T 5168/PHILDS 4368: Law and Ethics in E-Commerce
  - IS&T 5562: Advanced Web Development
  - IS&T 5885: Human-Computer Interaction
  - IS&T 5886: Prototyping Human-Computer Interactions
  - IS&T 6335: Mobile Technology for Business
  - IS&T 6445: Database Marketing
  - IS&T 6680: Advanced Web and New Media Studies
  - MKT 5310: Digital Marketing and Promotions
  - MKT 6580: Advanced Marketing Strategy

Enterprise Resource Planning (ERP)

Corporations worldwide have focused on improving business processes for the past two decades. In fact, while most Fortune 500 companies...
have already adopted enterprise resource planning (ERP) systems, now many midsize companies are also planning ERP implementations. With a commitment to keep pace with these changes in business processes and technology, the University of Missouri system joined SAP’s™ University Alliance and Microsoft’s™ University Alliance programs in order to continue and expand classroom capabilities for integrating ERP software into the curriculum.

ERP systems can be used to reinforce many of the concepts covered in the business discipline. ERP systems incorporate state-of-the-art technology, providing a comprehensive teaching tool for business and for information systems. Universities that have successfully incorporated an ERP system into their curricula find unprecedented student demand for those subjects.

ERP can be viewed as a combination of business management practice and technology, where information technology integrates with a company’s core business processes to enable the achievement of specific business objectives. This certificate prepares students for positions as both technical and business consultants in the ERP field.

A student admitted to this graduate certificate must complete four courses:

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ERP 5110</td>
<td>Enterprise Resource Planning Systems Design and Implementation</td>
</tr>
<tr>
<td>ERP 6120</td>
<td>Enterprise Resource Planning: Systems Config and Integration</td>
</tr>
<tr>
<td>ERP 5240</td>
<td>Enterprise Application Development and Software Security</td>
</tr>
<tr>
<td>ERP 5210</td>
<td>Performance Dashboard, Scorecard and Data Visualization</td>
</tr>
<tr>
<td>ERP 5310</td>
<td>Supply Chain Management Systems in an ERP Environment</td>
</tr>
<tr>
<td>ERP 5410</td>
<td>Use of Business Intelligence</td>
</tr>
<tr>
<td>ERP 5510</td>
<td>ERP System Administration</td>
</tr>
<tr>
<td>ERP 6220</td>
<td>Data Modeling &amp; Visualization Prototyping for Enterprise Decision Dashboards</td>
</tr>
<tr>
<td>ERP 6444/</td>
<td>Essentials of Data Warehouses</td>
</tr>
<tr>
<td>IS&amp;T 6444</td>
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<tr>
<td>ERP 6610</td>
<td>Advanced Customer Relationship Management in ERP Environment</td>
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</table>

**Human-Computer Interaction and User Experience**

There is a growing demand within industry for workers with expertise in human-computer interaction (HCI), who generally hold titles such as interface designer, usability researcher analyst; usability engineer; user experience specialist; or information architect. HCI specialists bridge the gap in organizations between groups who build the technologies and groups who use the technologies. The qualifications for these positions generally fall into the following categories:

- Knowledge of human-computer interaction principles
- Skills in collecting user requirements
- Skills in developing prototypes, both low fidelity (e.g., paper) and high fidelity (e.g., html mock-up)
- Skills in evaluation of the impact of technologies on humans

A student admitted to this graduate certificate must complete four courses:

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<tbody>
<tr>
<td>IS&amp;T 5885</td>
<td>Human-Computer Interaction</td>
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<tr>
<td>IS&amp;T 5886</td>
<td>Prototyping Human-Computer Interactions</td>
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</table>

**Information System Project Management**

Managing the development of large software systems is significantly different from managing construction or research projects. However, some of the tools developed for traditional project management continue to have value and can be adapted to development of software.

This certificate aims to equip students with a set of tools that will allow them to achieve Project Management Institute (PMI) standards in the project management area to successfully manage resources, and to analyze, evaluate and improve complex projects.

A student admitted to this graduate certificate must complete four courses:

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<tbody>
<tr>
<td>IS&amp;T 6261</td>
<td>Advanced Information Systems Project Management</td>
</tr>
<tr>
<td>ENG MGT 5320</td>
<td>Project Management</td>
</tr>
<tr>
<td>ENG MGT 6322</td>
<td>Case Studies in Project Management</td>
</tr>
<tr>
<td>ENG MGT 6323</td>
<td>Global Project Management</td>
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</table>

**Mobile Business and Technology**

Interest in the use of mobile technology among organizations has seen a strong, upward trend over the past few years. The proliferation of smart phone and tablet devices has presented organizations with new challenges creating and developing a coherent strategy associated with this new innovation. In order to create this strategy, organizations will need an understanding of the mobile industry in general and specific technologies supporting the trend. People capable of creating and maintaining mobile technology strategies are needed.

This certificate is designed to cover the mobile industry as well as the technologies, devices, operating systems, user interface design, and tools of mobile applications. The focus will be on the mobile industry and technologies that allow an organization to make decisions in this dynamic domain.

A student admitted to this graduate certificate must complete four courses:

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<tbody>
<tr>
<td>IS&amp;T 6335</td>
<td>Mobile Technology for Business</td>
</tr>
<tr>
<td>ERP 5240</td>
<td>Enterprise Application Development and Software Security</td>
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<tr>
<td>Two courses from the following list:</td>
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<td>ERP 5210</td>
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**Carla Pauline Bates**, Assistant Teaching Professor

PHD University of Missouri-Columbia

Learning styles, learning technologies.

**Randy Lawrence Canis**, Adjunct Professor

JD University of Missouri-Columbia

Privacy and information security law, patent law, intellectual property for computer scientist, legal environment for engineers.
Langtao Chen, Assistant Professor  
PHD Georgia State University  
Data analytics, human-computer interaction, social media, health informatics, machine learning, gameful design.

Yu Hsien Chiu, Associate Teaching Professor  
MASTER University of Wisconsin-Milwaukee  
Enterprise resource planning, accounting information systems.

Craig C Claybaugh, Associate Professor  
PHD University of Wisconsin-Milwaukee  
Enterprise resource planning, information technology vendor-client relationships, online trust, social networking.

Cassandra Carlene Elrod, Associate Professor  
PHD University of Missouri-Rolla  
Marketing in higher education, operations management, supply chain management, continuous improvement, project management, quality, and lean enterprise.

Li-Li Eng, Associate Professor  
PHD University of Michigan Ann Arbor  
Financial and managerial accounting, international accounting.

Hanqing Fang, Assistant Professor  
PHD Mississippi State University  
Strategic management, family business, entrepreneurship.

Barry B Flachsbart, Professor Emeritus  
PHD Stanford University  
Large databases, manufacturing information systems, information systems project management, team building and leadership, machine learning, and artificial intelligence.

Nobuyuki Fukawa, Associate Professor  
PHD Louisiana State University  
Consumer behavior, marketing research, marketing strategy.

Richard H Hall, Professor  
PHD Texas Christian University  
Human-computer interaction with a focus on learning technologies.

Michael Gene Hilgers, Professor  
PHD Brown University  
Modeling and simulation, leaning technologies, and human-computer interaction.

Bih-Ru Lea, Associate Professor  
PHD Clemson University  
Enterprise resource planning, performance dashboards, accounting information systems, data visualization, business process integration, and supply chain management.

Yu Liu, Assistant Professor  
PHD University of Oregon  
Empirical corporate finance, investment, OTC market, public finance, and political economics.

Fiona Fui-Hoon Nah, Professor  
PHD University of British Columbia  
Management information systems, E-commerce, mobile commerce, human-computer interaction.

Nicholas Oswald, Adjunct Instructor  
MASTER Missouri University of Science & Technology  
Human-computer interaction, implementing information systems, management information system, system analysis and design.

Keng Leng Siau, Professor  
PHD University of British Columbia  
Artificial intelligence/machine learning, business intelligence/analytics, design science, mobile, and ubiquitous business.

Sarah Margaret Stanley, Associate Professor  
PHD Saint Louis University  
Brand relationships, advertising effectiveness, social marketing and its effects on consumer brand choice.

Wen-Bin Yu, Associate Professor  
PHD University of Louisville  
Business intelligence, text mining, data mining, demand forecasting, simulation, and agent bases systems.

Hongxian Zhang, Assistant Professor  
PHD University of Texas at San Antonio  
Corporate finance, investments, public pension funds.

IS&T 5000 Special Problems (IND 0.0-6.0)  
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

IS&T 5001 Special Topics (LEC 0.0-6.0)  
This is designed to give the department an opportunity to test a new course. Variable title.

IS&T 5040 Oral Examination (IND 0.0)  
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/comprehensive examination (oral/written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

IS&T 5099 Research (IND 0.0-15)  
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

IS&T 5131 Foundations of Computer Architecture (LEC 3.0)  
Design-oriented foundations of computer components and operation. Standard codes; number systems; base conversions; computer arithmetic; boolean algebra; operating system components including memory management, device management; plus related computer architecture topics. Research paper required. Prerequisites: Graduate Standing, strong programming knowledge.
IS&T 5168 Law and Ethics in E-Commerce (LEC 3.0)
Provides the ethical framework to analyze the ethical, legal, and social issues that arise for citizens and computer professionals regarding the computerization of society. Topics include: free speech, privacy, intellectual property, product liability, and professional responsibility. (Co-listed with Philos 4368).

IS&T 5251 Technological Innovation Management and Leadership (LEC 3.0)
The course focuses on the knowledge and skills necessary for the development and implementation of effective strategies for the management of technology-based organizations. This involves: developing a general management perspective on technology and innovation, examining the problems of new product development, identifying distinctive technological competencies, licensing and marketing technologies, assessing the organizational and industrial context of technology. Prerequisite: Senior or Graduate Standing.

IS&T 5420 Business Analytics and Data Science (LEC 3.0)
Analysis of large business data sets via statistical summaries, cross-tabulation, correlation, and variance matrices. Techniques in model selection, prediction, and validation utilizing general linear and logistic regression, Bayesian methods, clustering, and visualization. Extensive programming in R is expected. Prerequisites: Calculus, Statistics, and Programming knowledge.

IS&T 5423 Foundations of Data Management (LEC 3.0)
Foundational concepts of database management systems. Issues in database architecture, design, administration, and implementation. Extensive use of SQL with Oracle to create and manage databases. Significant project dealing with triggers or stored procedures. Prerequisites: Graduate Standing, knowledge of MIS, programming ability.

IS&T 5520 Data Science and Machine Learning with Python (LEC 3.0)
Examines data science methodologies for scraping, manipulating, transforming, cleaning, visualizing, summarizing, and modeling large-scale data as well as supervised and unsupervised machine learning algorithms applied in various business analytics and data science scenarios. Python libraries such as Pandas, NumPy, Matplotlib, and Scikit-learn are utilized. Prerequisites: One of Stat 3111, Stat 3113, Stat 3115, or Stat 3117; one of IS&T 1552, IS&T 1562, Comp Sci 1575; for Graduate Students: knowledge of calculus, statistics, and programming.

IS&T 5535 Machine Learning Algorithms and Applications (LEC 3.0)
Introduces techniques of modern machine learning methods with applications in marketing, finance, and other business disciplines. Topics include regression, classification, resampling methods, model selection, regularization, decision trees, support vector machines, principal component analysis, and clustering. R programming is required. Prerequisites: One of Stat 3111, Stat 3113, Stat 3115, Stat 3117; one of IS&T 1552, IS&T 1562, Comp Sci 1575; or Graduate Standing with knowledge of calculus, statistics, and programming.

IS&T 5552 Advanced Web Development (LEC 3.0)
Advanced web development techniques to provide dynamic interaction; methods for extracting and delivering dynamic information to/from web servers - a hands-on approach. Emphasis on interaction with servers; mobile software development; processing of graphics and web video. Project work is required. Prerequisites: IS&T 4654; one of IS&T 1551, IS&T 1561.

IS&T 5585 Human-Computer Interaction (LEC 3.0)
Introduction to the field of Human-Computer Interaction (HCI). Students examine issues and challenges related to the interaction between people and technology. The class explores the social and cognitive characteristics of people who use information systems. Students learn techniques for understanding user needs, interface prototyping & interface evaluation.

IS&T 5586 Prototyping Human-Computer Interactions (LEC 3.0)
This course explores novel HCI and UX technologies as well as methods and tools for creating system prototypes, including best practices and guidelines for optimal user experiences. Example concepts include mobile applications, behavioral monitoring, gamification, natural user interfaces, haptics, and computers as social actors. Prerequisite: Preceded or accompanied by IS&T 5885.

IS&T 5587 Human-Computer Interaction Evaluation (LEC 3.0)
This course covers research and analysis methods and tools for evaluation of the impact of information technology systems on humans and organizations. The focus will be on practical evaluation with the goal of providing recommendations for improving system functionality and usability. Prerequisite: Preceded or accompanied by IS&T 5885.

IS&T 6000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

IS&T 6001 Special Topics (LEC 0.0-6.0)
This is designed to give the department an opportunity to test a new course. Variable title.

IS&T 6050 Continuous Registration (LEC 1.0)
Doctoral candidates who have completed all requirements for the degree except the dissertation, and are away from the campus must continue to enroll for at least one hour of credit each registration period until the degree is completed. Failure to do so may invalidate the candidacy. Billing will be automatic as will registration upon payment.

IS&T 6099 Research (IND 0.0-15)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

IS&T 6261 Advanced Information Systems Project Management (LEC 3.0)
Project management principles, first from a general perspective, and then focused specifically on information system application development are explored. Topics include requirements analysis, project scheduling, risk management, quality assurance, testing, and team coordination. Report writing and research literature searches are required. Prerequisites: IS&T MS Entrance requirements, with strong programming knowledge.
**IS&T 6335 Mobile Technology for Business** (LEC 3.0)
Overview of mobile technology use in business environments. Topics include: mobile industry; mobile network and wireless standards; mobile devices; mobile web design and app development; social and user experience issues; mobile marketing and commerce. Project required.

**IS&T 6336 Foundations of Internet Computing** (LEC 3.0)
The foundations of Internet Computing include computer networks and Web sites. Networks are covered thoroughly and research directions for networking and information security are discussed. Web site design and research findings about site usability considerations are examined. Prerequisite: IS&T MS entrance requirements, including solid programming knowledge.

**IS&T 6443 Information Retrieval and Analysis** (LEC 3.0)
Covers the applications and theoretical foundations of organizing and analyzing information of textual resources. Topics include information storage and retrieval systems, web search engines, text mining, collaborative filtering, recommender systems. Students will also learn the techniques with the use of interactive tools such as SAS. Prerequisite: ERP 5410 or statistics knowledge.

**IS&T 6444 Essentials of Data Warehouses** (LEC 3.0)
This course presents the topic of data warehouses and the value to the organization. It takes the student from the database platform to structuring a data warehouse environment. Focus is placed on simplicity and addressing the user community needs. Project required. Prerequisite: IS&T 5423 or equivalent relational database experience. (Co-listed with ERP 6444).

**IS&T 6445 Database Marketing** (LEC 3.0)
Intro to methods and concepts used in database marketing: 1) predictive modeling techniques (e.g., regression, decision trees, cluster analysis) and 2) standard processes for mapping business objectives to data mining goals to produce a deployable marketing model. Metrics like lifetime value of a customer and ROI will be covered. Several application areas covered. Prerequisite: Statistics understanding, programming understanding, familiarity with spreadsheets.

**IS&T 6448 Building the Data Warehouse** (LEC 3.0)
Data modeling and processes needed to populate a data warehouse; tradeoffs among several models and tools; technical issues that are faced, such as security, schemas, Web access, other reporting techniques. Prerequisite: IS&T 6444.

**IS&T 6450 Information Visualization** (LEC 3.0)
Topics/activities include: the visualization development framework, traditional presentations of data, human perception and aesthetics, colorspace theory, visualization algorithms and software, case studies of modern topology, research into visualization algorithms and implementations in R. Students will produce significant programs and visualizations. Prerequisites: Statistics, Calculus, and Programming Knowledge.

**IS&T 6641 Advanced Digital Commerce and the Internet of Things** (LEC 3.0)
Fundamental concepts of management and application to IT and support of commerce. Examines use of IT in business processes and everyday interactions such as IoT. Explores management issues of integrating IT into processes to run businesses better. Includes a major end-of-semester project. Prerequisites: Knowledge of management information systems.

**IS&T 6654 Advanced Web and Digital Media Development** (LEC 3.0)
This course covers advanced techniques and tools for the design and development of web-based media, including text, graphics, animation, audio, and video. This course is an advanced version of Web and Digital Media Development, with additional assignments.

**IS&T 6680 Advanced Web and New Media Studies** (LEC 3.0)
The course covers web culture, including topics such as social media; citizen journalism, crowd intelligence, privacy, and copyright. This course is an advanced version of Intro to Web Studies, with additional assignments.

**IS&T 6780 Adv Human and Organizational Factors in Cybersecurity** (LEC 3.0)
In-depth examination of human and organizational factors in cybersecurity and information assurance. Examines current challenges to protecting the integrity, availability, and confidentiality of information, as well as tools, methods, principles, and analytics for fraud prevention, insider threat detection, and forensic investigations. Project Required. Prerequisite: None, but recommended: IS&T 3333 or IS&T 6336 or Comp Sci 3600 or another introductory cybersecurity or information assurance course.

**IS&T 6887 Research Methods in Business and IS&T** (LEC 3.0)
This course covers quantitative and qualitative research methods for exploring the interaction between people and information technologies. The course covers techniques and tools for carrying out literature reviews, forming research goals, designing research, conducting data analyses; and preparing manuscripts and live presentations. (Co-listed BUS 6887).