

INFORMATION SCIENCE AND TECHNOLOGY

Information science and technology offers a bachelors degree focused on today's cutting-edge information technology. Students in information science and technology study the latest technology in areas including business analytics & data science, networking, database management systems, enterprise resource planning, e-commerce, and integrated business systems. Professionals in this field administer, maintain, and support computer systems and networks.

Today's business environments have a critical need for professionals who have an understanding of information technologies based on a broad knowledge of management practices, economics, psychology, and the humanities. These individuals are needed to implement technology to support business processes, managerial decision-making, and organizational communication.

As an information science and technology major, you will take courses that are rigorous and oriented toward building the foundation necessary for lifetime learning. Studying at Missouri S&T, you will benefit from the world-class computer environment and your association with excellent students from around the country and the world. Students in the program are strongly encouraged to do summer internships or co-ops with companies before they graduate. There are many rich opportunities and students benefit greatly in terms of their education and the edge they have seeking full-time employment once they graduate.

Bachelor of Science Information Science and Technology

In Information Science and Technology, the Bachelor of Science degree consists of 120 credit hours. All undergraduate students in Information Science and Technology are required to complete a General Education Requirements Core, including courses in Humanities, Social Sciences, Mathematics, Science, and Communication Skills.

A common departmental core of courses in Business and Information Technology helps provide students with skills to succeed in a fast-changing and globalized environment. Information Science and Technology (IS&T) Core courses and IS&T Electives provide students with comprehensive knowledge of information technology utilization in businesses. These courses include business analytics & data science, database management, systems analysis, introduction to data science and management, networks and communications, and cybersecurity. The electives for this degree consist of advanced coursework in the areas introduced by the required courses.

A minimum grade of "C" is required in the courses designated accordingly.

Students have 9 credit hours for free electives.

Freshman Year			
First Semester	Credits	Second Semester	Credits
BUS 1810	1	BUS 1110	3
IS&T 1551	3	BUS 1210	3
IS&T 1750	3	IS&T 1552	3
ENGLISH 1120	3	MATH 1212	4
Mathematical Science or Science Elective ¹	4	PSYCH 1101	3
14		16	

Sophomore Year			
First Semester	Credits	Second Semester	Credits
ERP 2110	3	IS&T 3420	3
SP&M S 1185	3	ECON 1100	3
ECON 1200	3	ENGLISH 2560 (or TECHCOM 2560)	3
Mathematical Science or Science Elective ¹	3	STAT 3111 or 1115	3
Fine Art, Social Science, or Humanities Elective ³	3	Science Elective ²	3
15		15	
Junior Year			
First Semester	Credits	Second Semester	Credits
FINANCE 2150	3	IS&T 3343	3
IS&T 3333	3	IS&T 4444	3
IS&T 3423	3	IS&T Elective	3
IS&T 4654	3	MKT 3110	3
IS&T Elective	3	POL SCI 1200	3
15		15	
Senior Year			
First Semester	Credits	Second Semester	Credits
IS&T 5520	3	BUS 5980	3
IS&T 5725	3	IS&T 5420	3
IS&T Electives	6	IS&T Elective	3
Free Elective	3	Free Electives	6
15		15	

Total Credits: 120

A grade of "C" or better is required in the following courses for graduation; BUS 1110, BUS 1210, BUS 1810, BUS 5980, ECON 1100, ECON 1200, ERP 2110, FINANCE 2150, MKT 3110, IS&T 1551, IS&T 1552, IS&T 1750, IS&T 3333, IS&T 3343, IS&T 3420, IS&T 3423, IS&T 4444, IS&T 4654, IS&T 5420, IS&T 5520, IS&T 5725 and all IS&T Electives (can include BUS 5730, BUS 5910, COMP SCI 4700, COMP SCI 5601, or any IS&T or ERP designated course at the 3000-level or above).

- ¹ Mathematical Science is defined as any MATH, STAT, COMP SCI or IS&T course not otherwise covered in the degree program. For definition of Science, refer to footnote 2.
- ² Any course in the following areas: biology, chemistry, geology, geological engineering, physics.
- ³ Any course in the following areas not used for other degree requirements: art, economics, English, foreign language, history, literature, music, philosophy, political science, psychology, sociology, theater.

Minors

You must see the department advisor and complete a minor application before beginning your minor. Requirements change over time. You will be held to the requirements in force at the time you apply for the minor. Postponing your application for the minor may result in you having to take additional courses to complete the minor. At least six (6) hours of the minor course work must be taken in residence at Missouri S&T.

Minor in Artificial Intelligence and Machine Learning in Business

The Minor requires 15 credit hours, as follows:

BUS 5730	Machine Learning and Artificial Intelligence for Business	3
IS&T 3420	Introduction to Data Science and Management	3
IS&T 5520	Data Science and Machine Learning with Python	3
And two courses from the following list:		6
STAT 1115	Statistics For The Social Sciences I	
or STAT 3111	Statistical Tools For Decision Making	
IS&T 3333	Data Networks and Information Security	
IS&T 3343	Systems Analysis	
IS&T 5420	Business Analytics and Data Science	
IS&T 5450	Introduction to Information Visualization	
IS&T 5535	Machine Learning Algorithms and Applications	
ERP 5410	Use of Business Intelligence	

Minor in Business

The minor in business and management systems requires the following 15 hours of coursework:

FINANCE 2150	Corporate Finance I	3
ECON 1100	Principles Of Microeconomics	3
or ECON 1200	Principles Of Macroeconomics	
BUS 1110	Introduction to Management and Entrepreneurship	3
BUS 1210	Financial Accounting	3
MKT 3110	Marketing	3

Minor in Business Analytics and Data Science

The minor in business analytics and data science requires the following 15 hours of coursework:

IS&T 1750	Introduction to Management Information Systems	3
IS&T 3423	Database Management	3
IS&T 3420	Introduction to Data Science and Management	3
Two courses from the following list:		6
IS&T 4641	Digital Commerce and IoT Analytics	
IS&T 5420	Business Analytics and Data Science	
IS&T 5450	Introduction to Information Visualization	
IS&T 5520	Data Science and Machine Learning with Python	
BUS 5730	Machine Learning and Artificial Intelligence for Business	

Minor in Cybersecurity Management and Information Assurance

This minor requires the following 15 hours of coursework:

BUS 5910	Privacy and Information Security	3
IS&T 3333	Data Networks and Information Security	3
IS&T 3420	Introduction to Data Science and Management	3
IS&T 5680	Digital Media Development and Interactive Design	3
IS&T 5725	Fundamentals of Cybersecurity Analytics	3

Minor in Digital Supply Chain Management

The minor in digital supply chain management requires the following 15 hours of coursework:

BUS 5360	Business Operations	3
or MECH ENG 3653	Manufacturing	
ERP 5310	Supply Chain Management Systems in an ERP Environment	3
ERP 4610	Customer Relationship Management in ERP Environment	3
or MECH ENG 5760/	Probabilistic Engineering Design	
AERO ENG 5760		

Two courses from the following list: *		6
ERP 5410	Use of Business Intelligence	
ERP 5110	Enterprise Resource Planning Systems Design and Implementation	
MECH ENG 5708	Rapid Product Design And Optimization	
MECH ENG 5656	Design For Manufacture	
MECH ENG 5757/	Integrated Product And Process Design	
ENG MGT 5515		
MECH ENG 5763	Computer Aided Design: Theory and Practice	

* Non business and information technology students must select ERP 5110 as one of the two electives.

Minor in Enterprise Resource Planning (ERP)

The minor in ERP requires the following 15 hours of coursework:

BUS 1210	Financial Accounting	3
ERP 2110	Introduction to Enterprise Resource Planning	3
ERP 5110	Enterprise Resource Planning Systems Design and Implementation	3
Six credit hours of electives from any other ERP-designated courses at the 4000-level or above		6
Total Credits		15

Minor in Entrepreneurship

The minor in entrepreneurship requires the following 15 hours of coursework:

BUS 1110	Introduction to Management and Entrepreneurship	3
BUS 5980	Business Models for Entrepreneurship and Innovation	3
MKT 5310	Digital Marketing and Promotions	3
Two courses from the following list:		6
BUS 5150	Customer Focus and Satisfaction	
BUS 5580	Strategic Management	
IS&T 4641	Digital Commerce and IoT Analytics	
IS&T 4654	Introduction to Web Design and Digital Media Studies	
IS&T 5251	Management and Leadership of Technological Innovation	
ENG MGT 5511	Technical Entrepreneurship	
ENG MGT 5411	Engineering Design Optimization	

Minor in Finance

The minor in finance requires the following 15 hours of coursework:

ECON 1100	Principles Of Microeconomics	3
or ECON 1200	Principles Of Macroeconomics	
FINANCE 2150	Corporate Finance I	3
BUS 5230	Financial Data Analysis and Storytelling	3
FINANCE 5260	Investments I	3
FINANCE 5310	Financial Technology and Analytics	3
Total Credits		15

Minor in Financial Technology, Analytics and Transformation

The Minor requires 15 credit hours, as follows:

Required Courses:		6
FINANCE 2150	Corporate Finance I	
FINANCE 5310	Financial Technology and Analytics	
One or more of the following courses must be taken:		3
IS&T 3420	Introduction to Data Science and Management	
BUS 5230	Financial Data Analysis and Storytelling	

One or more of the following courses must be taken:		6
IS&T 4641	Digital Commerce and IoT Analytics	
IS&T 5780	Human and Organizational Factors in Cybersecurity	
IS&T 5520	Data Science and Machine Learning with Python	
ERP 5210	Performance Dashboard, Scorecard and Data Visualization	
ERP 5410	Use of Business Intelligence	
FINANCE 5260	Investments I	

Minor in Information Science and Technology

The minor in information science and technology requires the following 15 hours of coursework:

IS&T 1750	Introduction to Management Information Systems	3
IS&T 1551	Implementing Information Systems: User Perspective	3
IS&T 1552	Implementing Information Systems: Data Perspective	3
ERP 2110	Introduction to Enterprise Resource Planning	3
One other IS&T or ERP course at the 2000 level or above.		3

Minor in Management

The minor in management requires the following 15 hours of coursework:

BUS 1110	Introduction to Management and Entrepreneurship	3
Four courses from the following list:		12
BUS 2910	Business Law	
BUS 5111	Business Negotiations	
BUS 5150	Customer Focus and Satisfaction	
BUS 5360	Business Operations	
BUS 5470	Human Resource Management	
BUS 5580	Strategic Management	
BUS 5910	Privacy and Information Security	
IS&T 4261	Information Systems Project Management	
ENG MGT 3320	Introduction to Project Management	

Minor in Marketing

The minor in marketing requires the following 15 hours of coursework:

ECON 1100	Principles Of Microeconomics	3
or ECON 1200	Principles Of Macroeconomics	
MKT 3110	Marketing	3
Three courses from the following list:		9
MKT 3210	Consumer Behavior	
MKT 4580	Marketing Strategy	
MKT 5310	Digital Marketing and Promotions	
MKT 5320	Marketing for Non-Profits	
MKT 5410	Big Data Consumer Analytics	
ERP 4610	Customer Relationship Management in ERP Environment	
Other marketing electives approved by the department (MKT 3000 and above)		

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IS&T 1001 Special Topics (IND 0.0-6.0)

This is designed to give the department an opportunity to test a new course. Variable title.

IS&T 1310 Exposure to Computer Experience (LEC 3.0)

The course provides an overview of simple computing concepts. Students are gently introduced to programming and discuss the impact of computing on society. Students are made aware of various computing-related careers.

IS&T 1311 Exposure to Computing Principles (LEC 3.0)

Students are introduced to various computing concepts including computer graphics, algorithms, agile development, the world wide web, e-commerce and mobile applications.

IS&T 1312 Computer Programming Exposure (LEC 3.0)

The course exposes students to principles of programming including variables, data types, expressions, assignment, variables, classes, arrays and other data structures and recursion.

IS&T 1314 Exposure to Cybersecurity Concepts (LEC 3.0)

This course provides an overview of basic cybersecurity issues, including evaluating of security needs, cryptography, and threat assessment. The course covers a broad array of security topics including data security, network security, security ethics and security as a computing profession. Students are exposed to various industry-standard security tools.

IS&T 1551 Implementing Information Systems: User Perspective (LEC 3.0)

Introduction to object-oriented programming in the context of developing and implementing the various components of an information system with particular attention given to system interface such as window and web forms. Class will include numerous projects covering foundational programming.

IS&T 1552 Implementing Information Systems: Data Perspective (LEC 3.0)

Continuation of object-oriented programming in the context of developing and implementing the various components of an information system with particular attention given to database incorporation. Class will include numerous projects covering intermediate topics. Prerequisites: IS&T 1551.

IS&T 1561 Algorithms and Programming with Java (LEC 3.0)

Introduction to programming using Java. Topics include basic programming concepts such as variable data, decision-making, and repetitive code. Also algorithm design and analysis, event-driven design with classes and methods. Numerous programs and group exercises.

IS&T 1562 Java and Data Structures (LEC 3.0)

Provides an intermediate knowledge of programming using Java. Important concepts of Object Oriented programming will be covered. A significant part of the course will be devoted to data structures and how to handle them. Numerous programs will be assigned. Prerequisites: IS&T 1561.

IS&T 1750 Introduction to Management Information Systems (LEC 3.0)

This course familiarizes the students with the fundamental concepts and principles of management information systems. Topics covered include the strategic role of IT, decision support systems, database and datawarehouse, enterprise applications, mobile applications, and social and ethical issues related to information systems.

IS&T 2000 Special Problems (IND 0.0-6.0)

Problems or readings on specific subjects or projects in the department. Consent of instructor required.

IS&T 2001 Special Topics (IND 0.0-6.0)

This is designed to give the department an opportunity to test a new course. Variable title.

IS&T 2002 Cooperative Training in Information Science & Technology (IND 0.0-6.0)

On-the-job experience gained through cooperative education with industry with credit arranged through departmental co-op advisor. Grade received depends on quality of reports submitted and work supervisors's evaluation. Prerequisite: Completed 30 hours toward degree.

IS&T 3000 Special Problems (IND 0.0-6.0)

Problems or readings on specific subjects or projects in the department. Consent of instructor required.

IS&T 3001 Special Topics (LEC 0.0-6.0)

This course is designed to give the department an opportunity to test a new course. Variable title.

IS&T 3131 Computing Internals and Operating Systems (LEC 3.0)

Design-oriented introduction to computer components and operation. Standard codes; number systems; base conversions; computer arithmetic; boolean algebra; operating system components including memory management, device management, and I/O management; and related issues are covered. Prerequisite: A grade of "C" or better in IS&T 1562 or IS&T 1552 or Comp Sci 1575.

IS&T 3333 Data Networks and Information Security (LEC 3.0)

The course provides an overview of current and evolving networking and information security principles. Concepts include network standards and protocols; operation and management; switching and routing; area networks; wireless network infrastructure; security frameworks, policies, and management. Prerequisites: At least Sophomore standing.

IS&T 3343 Systems Analysis (LEC 3.0)

Introduction to the processes by which business information systems are analyzed, designed, and introduced into the business environment. Topics include investigation of existing systems, requirements analysis, logical and physical design, database design, forms design, and report analysis. Prerequisite: IS&T 3423.

IS&T 3420 Introduction to Data Science and Management (LEC 3.0)

Introduces students to increasing business success through analysis of large-scale data collections. Topics include: import/export of data, summary statistics, cross-tabulation, data transformations (sub setting, merging, sorting and aggregation), modeling methods, and visualization. Significant programming in R is expected. Prerequisites: IS&T 1562 or IS&T 1552 or Comp Sci 1575.

IS&T 3423 Database Management (LEC 3.0)

The course introduces the concepts of database management systems. Issues in database architecture, design, administration, and implementation are covered. Prerequisites: IS&T 1750; A grade of "C" or better in IS&T 1551 or IS&T 1561 or Comp Sci 1570.

IS&T 4000 Special Problems (IND 0.0-6.0)

Problems or readings on specific subjects or projects in the department. Consent of instructor required.

IS&T 4001 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 4099 Undergraduate Research (IND 0.0-6.0)

Designed for the undergraduate student who wishes to engage in research. Not for graduate credit. Not more than six credit hours allowed for graduation credit. Subject and credit to be arranged with the instructor.

IS&T 4261 Information Systems Project Management (LEC 3.0)

The course overviews general project management principles and then focuses on information system application development. Topics include requirements analysis, project scheduling, risk management, quality assurance, testing, and team coordination. Prerequisites: A grade of "C" or better in IS&T 1551 or IS&T 1561 or Comp Sci 1570.

IS&T 4444 Introduction to 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. Prerequisites: IS&T 3423.

IS&T 4641 Digital Commerce and IoT Analytics (LEC 3.0)

Introduction to methods and concepts of data analytics that provides digital marketers and managers the foundation needed to make decisions or detect patterns based on data from eCommerce websites or from Internet of Things (IoT) devices. Key metrics, process, and challenges will be covered. Prerequisites: IS&T 1750 and at least Sophomore standing.

IS&T 4654 Introduction to Web Design and Digital Media Studies (LEC 3.0)

The course covers web design and digital media, including topics such as social media, cyberculture, service design thinking, citizen journalism, crowd intelligence, brain-computer interfaces, privacy, and copyright.

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 5251 Management and Leadership of Technological Innovation (LEC 3.0)

The course covers strategic management of technological innovation and leadership in managing technology-based organizations. It focuses on developing a general management perspective on technology, innovation, industry dynamics of technological innovation, and new product development. Prerequisite: Senior or Graduate Standing.

IS&T 5335 Fundamentals of Mobile Technology for Business (LEC 3.0)

A broad overview of mobile technology use in business environments. Topics include the mobile industry; mobile network and wireless standards; mobile devices; mobile web design and app development; social and user experience issues; mobile marketing and commerce. Prerequisites: Junior standing or above.

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: Strong programming knowledge required.

IS&T 5450 Introduction to Information Visualization (LEC 3.0)

Topics include: the visualization development framework, traditional presentations of data, human perception and aesthetics, colorspace theory, visualization algorithms and software, modern visualizations of large data sets. Application of R packages will be emphasized throughout. Prerequisites: Statistics, Calculus, and Programming Knowledge.

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 5680 Digital Media Development and Interactive Design (LEC 3.0)

This course covers techniques and tools for design and development of digital and interactive media, including text, graphics, animation, audio, and video. Prerequisites: A grade of "C" or better in IS&T 1551, IS&T 1561 or Comp Sci 1570.

IS&T 5725 Fundamentals of Cybersecurity Analytics (LEC 3.0)

This course presents students with a basic understanding of cybersecurity topics, which span organizational information security policies, data breaches, awareness training, network security, application security, cloud security, data management, business continuity, and the latest cybersecurity issues.

IS&T 5780 Human and Organizational Factors in Cybersecurity (LEC 3.0)

In-depth examination of human and organizational factors in cybersecurity and information assurance. Study of how to protect information integrity, availability, and confidentiality, as well as tools, methods, principles, and analytics for fraud prevention, insider threat detection, and forensic investigations. Assumes prior exposure to cybersecurity or IA.

IS&T 5885 Human-Computer Interaction and User Experience (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 5887 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.
