

COMPUTER INFORMATION SYSTEMS (CS)

CS 590 Internship in Information Technology (1 credit)

A one-credit field-based educational experience for Bentley graduate students, with the opportunity to (1) develop an understanding of computer information systems practices in today's organizations, (2) apply knowledge of computer information systems techniques in a real live setting, (3) develop skills associated with computer-based systems development, deployment and/or support, (4) and develop an understanding and appreciation of today's diverse business culture and values, including team-based performance norms, self-directed team work, and working in a diverse, global business environment. This internship option is available exclusively to Bentley graduate students who have a CS focus in their program of study (MSIT, MBA/MSIT, MBA/IST). Students must work a minimum of 120 hours at an approved organization, complete a reflection paper, and coordinate their performance appraisal with their specified site supervisor.

Typically Offered: Fall and Spring

CS 602 Data-Driven Development with Python (3 credits)

Programming Intensive

Python is an easy to learn, widely versatile programming language whose extensive collection of external libraries makes it a popular choice for business analytics and visualization, data science, artificial intelligence, scientific and numeric computing, and many other applications. Its compatibility with leading analytics tools that are widely used in enterprises also places it in high demand. Students in this course will first learn the fundamentals of programming that are common to all programming languages. They will then work with Python libraries to perform common analytics tasks. No prior programming experience is required.

Typically Offered: Fall and Spring

CS 603 Algorithmic Thinking with Java (3 credits)

This course teaches programming using the Java language, which is widely used in business. By focusing on algorithm development, data structures, logical reasoning skills, and sound programming practices, students learn to analyze and tackle business programs with software solutions. Emphasis is placed on the importance of writing and thoroughly testing code that is well structured and runs efficiently. Students first gain a solid understanding of programming fundamentals before delving into higher-order concepts, including abstract data types. Practical hands-on exercises and assignments using a well-known, integrated development environment reinforce algorithmic thinking, programming, and debugging skills. No prior programming experience is required.

Typically Offered: Fall

CS 605 Data Management and SQL for Analytics (3 credits)

Programming Intensive

This course teaches foundational data management, retrieval, and manipulation skills with an emphasis on enabling the students to form a strong foundation for analytical processes. It builds a foundation for understanding various domains of practice with conceptual data modeling and demonstrates how the same conceptual needs can be served with different data management technologies. The course covers relational technologies for both operational databases and data warehouses and non-relational data management infrastructures for analytics. The course will help the students develop strong skills in the use of the SQL language for database definition and data manipulation.

Typically Offered: Fall and Spring

CS 607 Cybersecurity (3 credits)

This course provides a technical focus on information, computer and network security, which together form the basis for securing enterprise systems and services. It introduces what cybersecurity means, both in the abstract and in the context of business information systems. Students learn relevant cybersecurity issues, technologies and approaches found in the contemporary enterprise. Students recognize and understand threats to privacy, confidentiality, integrity and service availability as well as best practices to defend both digital and physical assets against such threats.

Typically Offered: Fall and Spring

CS 610 Enterprise Architecture (3 credits)

This course explores the design, selection, implementation and management of enterprise IT solutions. The focus is on applications and infrastructure and their fit with the business. Students learn frameworks and strategies for infrastructure management, system administration, content management, distributed computing, middleware, legacy system integration, system consolidation, software selection, total cost of ownership calculation, IT investment analysis, and emerging technologies. These topics are addressed both within and beyond the organization, with attention paid to managing risk and security within audit and compliance standards. Students also read current vendor and analyst publications and hone their ability to communicate technology architecture strategies concisely to a general business audience.

Typically Offered: Every two or more years

CS 612 Cloud-Based Enterprise Applications (3 credits)

Pre-Req: CS 602 and CS 605

This course provides a hands-on introduction to several cloud based technologies and automation tools that are commonly utilized to develop enterprise applications. The course also considers the impact of these technologies in a business context. Students learn how to develop dynamic, data-driven enterprise applications that are continuously integrated and continuously delivered. These applications enable businesses to interact with their customers, employees, and suppliers, and provide online access to information that supports decision-making. Students enrolled in this course are expected to have basic proficiency in a programming language (Java or Python) and relational databases.

Typically Offered: Every two or more years

CS 620 Software Project Management (3 credits)

Pre-Req: CS 605, CS 610, and (MSIT student with CS 603 or MSDI student with CS 602)

This course provides the technical knowledge and skills for successfully managing and executing globally distributed software projects in agile and hybrid environments. Topics covered include proposal and contract management, requirements management, modeling, user experience, project planning, effort estimation, staffing, automation, status, and quality assurance. Students will learn the methods and tools that support these processes, develop a toolkit for creating a project plan for a distributed application, and engage in a project to improve these capabilities.

Typically Offered: Every two or more years

CS 650 Data Analytics Architectures with Big Data (3 credits)

Pre-Req: CS 602 and CS 605

The architecture of modern database systems for data analytics with big data are examined. This course provides a hands-on introduction to several architectures and approaches for data for analytics, including data from operational transactions, sensor data, web logs and social media sites. It explores the different types of data that make up the big data space, and applies capture and storage technologies appropriate for relational and non-relational models, such as clickstreams and user navigation of web sites. Data will be explored using Python-based tools for analytics and visualization. Students enrolled in this course are expected to have basic proficiency in the Python programming language and relational databases.

Typically Offered: Every two or more years

CS 653 Generative AI for Business – Solutions and Strategies (3 credits)

Pre-req: CS 602 or MA 705

This course offers a comprehensive introduction to Generative Artificial Intelligence (GenAI) and Natural Language Processing (NLP) technologies, covering fundamental artificial intelligence (AI) and machine learning concepts before focusing on advanced applications. Students will explore state-of-the-art Large Language Models (LLMs), such as ChatGPT, Claude, and DeepSeek, practical implementation using APIs and Huggingface, and essential techniques like prompt engineering and Reinforcement Learning with Human Feedback (RLHF). The curriculum examines real-world applications across business domains while addressing critical human factors including human-AI interaction, trust, and ethical considerations. Through hands-on exercises and projects, midterm and final exams, students will gain both theoretical knowledge and practical skills to apply AI and Generative AI techniques effectively.

Typically Offered: Spring

CS 655 Managing with Analytics (3 credits)

Students who completed IPM 652 not eligible to take this course

The course will provide a management-focused perspective on analytics, the role of data, and AI's growing influence on analytics in businesses. There is an emphasis on business fundamentals for analytics professionals (and how analytics, data collection, and AI can be integrated into business processes), the value of analytics, data, and AI in organizations (including constraints and consequences such as those related to privacy, security, transparency, and ethics), and the practice of analytics (understanding and framing ill-defined business problems, exploring and visualizing problem-related data, identifying actionable insights, and communicating the results). The course will feature hands-on exercises with real-world data and analytics applications.

Typically Offered: Fall and Spring

CS 680 Mobile Application Development (3 credits)

Pre-Req: CS 603 and (Pre- or Co-Req: CS 605)

This course is an introduction to developing mobile applications, beginning with mobile operating system capabilities and application architecture and extending to major components, such as activities, services, broadcast receivers and others. Students learn how to develop interactive applications using widget libraries, web-based services, animation, an SQL database engine, and multithreading. Students in this course are expected to have proficiency in Java, website development and SQL queries.

Typically Offered: Every two or more years

CS 700 Directed Study (3 credits)

A Directed Study is designed for highly qualified students who, under the direction of a member of the sponsoring academic department, engage in an agreed-upon, in-depth, independent examination, investigation or analysis of a specialized topic.

Typically Offered: Fall and Spring

CS 701 Internship in Information Technology (3 credits)

This course affords students the opportunity to enhance self-realization and direction by integrating classroom study with experience in vocational learning situations. It requires development of a study plan to identify students' professional goals and to demonstrate how these goals can be furthered through an internship experience. This course includes regular meetings in which students discuss issues and business problems related to their work experience, and defend proposed solutions before fellow students and the internship coordinator.

Typically Offered: Fall and Spring

CS 703 Looking into the Future: Automation and Digital Technologies (3 credits)

This course will survey a range of new and evolving digital technologies, their applications and issues surrounding their use. This discussion-based course will be co-taught by several faculty members, who will lead class meetings, followed by discussions examining issues surrounding the use of the presented technologies in practice. The choice of topics will depend on the contributing faculty and vary from one semester to another. Assignments will include extensive readings and reflections on the topics under study, written summaries and group presentations on specific technologies, and the development of forward-looking ideas on applications of technologies of interest to students and faculty members.

Typically Offered: Every two or more years

CS 725 Information Security, Controls and Ethics (3 credits)

Students who completed IPM 723 are not eligible for this course

This course presents an overview of information security issues that must be addressed by organizations in today's ubiquitously networked environments. Specific coverage will include information security risks and related protection of data, networks and application software. While the primary focus is on how to protect organizational information assets, other topics will include strategic uses of security in business, the impact of security risk on various industries, as well as the security and privacy rights and responsibilities of end users and home computer operators. The course is designed to help students think critically about the local, national and global information security issues in our highly networked society.

Typically Offered: Once a year

CS 733 Artificial Intelligence Techniques and Applications (3 credits)

Pre-Req: CS 602

Programming Intensive

This course introduces students to the foundations of artificial intelligence (AI) and its use in automation. Fundamental concepts and techniques behind software agents, automated reasoning, machine learning and robotics are introduced and illustrated with applications in various domains. Students will learn how these techniques can be integrated into business operations and functions to increase productivity and to support strategic decision making in organizations. Students will have opportunities to explore AI-based software and tools and discuss the ethical issues related to the development and use of AI.

Typically Offered: Every two or more years

CS 741 Enterprise Systems Planning and Configuration (3 credits)

Pre-Req: GR 602, GR 602D, GR 602P, or AC 730

Students who have completed IPM 740 are not eligible for this course

An enterprise system forms the backbone of a company. Business information is collected, shared and reported using an enterprise system, which needs to be tailored to support a company's business processes. In this course, students gain hands-on experience planning for and configuring enterprise systems, using the world's leading enterprise software product from SAP. Students will experience the Request for Proposal process, translate business process needs into module-based design requirements, and design test plans for the processes they configure. They will gain a deep understanding of how business processes are instituted in a company setting, and how carefully configured software can lead to efficiency and effectiveness gains and support competitive strategy. This course prepares students to participate in enterprise system implementation and evaluation processes as a consultant, business systems analyst, subject matter expert or auditor.

Typically Offered: Once a year

CS 753 Business Intelligence Methods and Technologies (3 credits)

Pre-Req: CS 605

Programming Intensive

This course expands students knowledge and skills gained in database management courses and looks in depth at business intelligence methods and technologies. The course examines the entire business intelligence life cycle, including system architecture design, data processing, modeling, warehousing, online analytical processing and reporting. Case studies of organizations using these technologies to support business intelligence gathering and decision-making are examined. This course also provides hands-on experience with state-of-the-art business intelligence methods and tools.

Typically Offered: Once a year

CS 795 Special Topics Seminar (3 credits)

Pre-Req: Varies by topic

This course offers a structured opportunity for exploring new business applications of emerging hardware or software technologies. It requires active student participation in developing and presenting course materials.

Typically Offered: As needed

CS 799 Experimental Course in CS (3 credits)

Pre-Req: Varies by topic

Experimental courses explore curriculum development, with specific content intended for evolution into a permanent course. Topics may be offered twice before it becomes a permanent course. Students may repeat experimental courses with a different topic for credit.

Typically Offered: As needed

CS 801 Information Technology Management and Policy (3 credits)

This course explores the issues and approaches in managing the information systems function in organizations. It takes a senior management perspective in exploring the development and implementation of plans and policies to achieve efficient and effective information systems. The course addresses issues relating to defining the IT infrastructure and the systems that support the operational, administrative and strategic needs of the organization.

Typically Offered: Every two or more years

CS 881 Computer Information Systems Internship (3 credits)

This course provides an opportunity for advanced MSIT students to exercise theory, knowledge and skills developed through the program, by serving as an information systems professional in a real employment environment. Through the internship coordinator, students solicit and respond to internship offers from commercial, governmental and nonprofit employers. Students maintain contact with the internship coordinator and critically analyze their work experience in a formal paper. Students have the option of making a presentation to the CIS community upon completing the internship, which normally spans one academic term.

Typically Offered: Fall and Spring