

The Major in Information Systems Courses

Note on Course Numbers

Each Carnegie Mellon course number begins with a two-digit prefix which designates the department offering the course (76-xxx courses are offered by the Department of English, etc.). Although each department maintains its own course numbering practices, typically the first digit after the prefix indicates the class level: xx-1xx courses are freshmen-level, xx-2xx courses are sophomore level, etc. xx-6xx courses may be either undergraduate senior-level or graduate-level, depending on the department. xx-7xx courses and higher are graduate-level. Please consult the Schedule of Classes (<https://enr-apps.as.cmu.edu/open/SOC/SOCServlet>) each semester for course offerings and for any necessary pre-requisites or co-requisites.

67-100 Information Systems Freshman Workshop

Fall: 1 unit

This class provides an overview of the Information Systems Program for freshman students. The Program's academic advisor facilitates discussion of the field of IS, the curriculum, and careers, as well as co-curricular experiences such as internships and study abroad. Guest lecturers include the IS faculty, IS alumni, the IS career consultant, and various campus representatives. Discussions will include students' progress in their first semester, as well as guidance in course planning, for creating their Spring semester schedule of classes, and their overall four-year plan.

67-101 Concepts of Information Systems

Spring: 6 units

This course provides an overview of the core concepts of information systems, and the impact of IS on the broader world. To this end, students will be exposed to the key concepts of people, process, and technology in information systems through lecture, case study, and project experience. Time in lecture will discuss topics such as the history of IS, the economics of information, as well as the key organizational and social issues. The class will study in detail the development of an IS project, and review some of the skills necessary for successful implementation of information systems. Finally, students will put these concepts into practice by working in small teams on an innovation project. This course is for Information Systems Freshmen only.

67-102 Concepts of Information Systems

Fall: 9 units

This course is an introduction to the world of Information Systems (IS). It introduces the core concepts of IS and its importance in the modern world around us. The course provides a general overview on the implications of information systems on organizations, by describing what an information system is; presenting some IS applications and discussing the implications of information systems on social and human aspects. The course also provides an initiation to essential information systems skills such as team work and project management.

67-103 Fundamentals of Web Design

Spring: 3 units

This course utilizes a hands-on approach to teaching the fundamentals of HTML5, CSS3 and Javascript (using jQuery). Each class starts with a brief presentation on a particular aspect of web design and then students use the remaining time to work through a technical challenge under the guidance of faculty and teaching assistants. This course is for Information Systems Freshmen only.

67-201 Introduction to Information Security and Management

Fall: 9 units

TBD

67-205 Principles of Front End Engineering

Spring: 6 units

Front-End Engineers create code that make websites interactive and exciting. That code is interpreted by a web browser or other client, using HTML, CSS, JavaScript, XML/XSLT, and Flash/Flex and differ from application development performed by Back-End Engineers. Freshman or Sophomore status major Information Systems, Computer Science or Business. Prerequisites or co-requisite:15110

67-211 Introduction to Business Systems Programming

Fall and Spring: 6 units

This course examines the fundamentals of business systems, particularly transaction processing systems. Topics include records processing, data representations, file structures, and basic algorithms common to business systems. The relationship of transaction processing and Big Data tools is covered. The course is a mix of lectures, which examine the history and current practices of business systems technology, and programming exercises that illustrate the core concepts. The programming exercises use the CoBOL programming language as an example of a language designed to be used to program business systems. No prior knowledge of CoBOL is needed. Some minimal programming experience is necessary. Good listening skills and class interaction are required.

67-240 Mobile Web Design & Development

Fall and Spring: 9 units

The Mobile Web Design and Development course provides a solid web design and development foundation focusing on responsive and user-centered design, and client-side components. Students explore the current standards and best practices of web design. Throughout the course, students work with HTML5, CSS3, Twitter Bootstrap, and Javascript, and learn how the various web components function together. The course utilizes a hands-on approach to guide students through learning and understanding the design and development process. This course is primarily designed for students with minimal technical experience. By the end of the course, students will be able to plan, design, and implement a basic functioning mobile web site/ app.

Prerequisites: 15-104 Min. grade C or 15-112 Min. grade C

67-250 The Information Systems Milieux

Spring: 9 units

Information systems (IS) are changing work practices, reshaping organizations, transforming cultures, and giving new meaning to the ways we see the world. This course is designed to help students understand the role of IS in modern society and the means by which these systems are created. It provides not only a framework for understanding information and information systems, but also a language to identify their dynamic complexities and inter-dependencies. Topics include: current trends in IS, structured approaches to the creation of IS, corporate IS competitive advantage, business process improvements/re-engineering, eCommerce and the digital economy, knowledge management, decisions support systems, and the implications of IS for people, organizations and society. Classes will use a combination of lectures, class discussions, reading assignments, case studies, group projects, and "hands-on" work in database design. This course is a required professional core course for IS freshmen only.

67-260 Visualizing Complex Information

6 units

This studio course meets two times per week and teaches students how to display complex information in clear and compelling ways. Students will be taught the organizational principles of good information architecture. Assignments are centered around the visual display of complex information, with a strong emphasis on developing structures, or grids to support the display of data. Legibility, visual organization, and typographic hierarchy are tools that are implemented in all assignments. We will begin to explore the relationships between form & content, and type & image. Students will learn how to make appropriate creative decisions for large posters and small business cards, as well as multiple-page documents. Design is a process and students must show their work as it evolves. This process includes: analyzing text, organizing content, visual organization, generating pencil sketches, and producing computer iterations. Personal growth as it relates to assignments is paramount to the students' success in this class, regardless of the level of experience coming in to the class. This course is intended for Information Systems sophomores. Others may enroll by instructor permission as space is available.

67-262 Database Design and Development

Fall: 9 units

Data driven decision making is a core process of organizations. In this class students will study the principles of database management systems, their design, and development. Recent alternatives to the classical relational model will also be examined. This course is a required professional core course and is open only to sophomores in the IS major who have completed 67-250 or equivalent.

Prerequisites: (15-121 or 15-112 or 15-122) and 67-250

67-265 Design Fundamentals I: Shaping Interactions and Experiences

Fall: 9 units

This is an introductory course in interaction design, user experience, and the process of designing for people and technologies. The course introduces students to basic human-centered design research and concept development in the development of digital, service, and user experiences. Students also develop component skills in user interface design. Coursework promotes design thinking and practice for application in tech fields. Offered only on the Qatar campus.

67-272 Application Design and Development

Spring: 9 units

This course provides students with the concepts and techniques to design and develop software applications, and to understand the design process. Students will learn the importance of user-centered design and will develop a prototype of a web application as a course project. In the process of developing the application, students will learn how to design and create relational databases, how to acquire competency in new programming languages quickly, how to use the Model-View-Controller pattern to develop software applications, how to ensure technical quality in software development, and how to apply principles of user-centered design. This course is a required professional core course and is open only to sophomores and juniors in the IS major who have completed 67-250 or equivalent.

Prerequisites: (15-122 or 15-121) and 67-262

67-279 Introduction to Geographical Information Systems

Fall: 6 units

Geographical Information Systems (GIS) allow us to visualize information that uses location. Through displaying layers of information in computer generated maps, we can see, analyze, understand and explore spatial patterns and relationships in new and novel ways. People in many different fields use Geographical Information Systems in their work: for visualizing the environment, human development, demographics, traffic and transportation, public health and many more. In this course, students will learn the basics of GIS through hands-on experience with popular mapping tools. Sources of data, principles of coordinate and projection systems and elementary geo-analysis techniques will be included. Upon completion of the course, students will have the background to begin using GIS techniques in their own areas of interest and will be prepared for further study in advanced GIS courses.

67-280 Special Topics: Information System Security

Fall: 9 units

This course is an introduction to information security from an information systems perspective. The course will introduce the student to fundamental concepts in information system security, including operational issues, planning, and design. Topics will include confidentiality, integrity, and availability; risk; access controls and access control frameworks; security policies; authentication strategies and issues; auditing; using cryptography; security design issues; controlling information flows; malicious logic; and applying security principles.

Prerequisite: 67-272

67-300 Special Topics: Search Engines

Intermittent: 6 units

This mini course will cover the fundamental aspects of modern search engines. The main intent is to provide a glimpse on how Google, Bing and many other websites search boxes work. Students will have the unique chance to implement their own search engine, exploring options for the Arab world, in a similar way that Yandex works in Russia and Seznam in Czech Republic. By the end of this course, the students will be able to discover, step-by-step, how a modern search engine works. They will become familiarized with basic and advanced concepts of Information Retrieval Theory: information theory, ranking models, evaluation. Finally, they will have an opportunity to build their own search engine in Python.

Prerequisites: 15-122 or 15-121

67-301 Networks and Telecommunications

Intermittent: 9 units

This course will introduce students to the basics of telecommunications, including voice, data, video, and wireless, with an emphasis on data. The course will cover both technical and business aspects of networking, and will consider regulatory and industry factors affecting telecommunication networks. Students will be introduced to the concepts and terminology of networks, including layered network models, and to practical issues involved in designing, managing, and using networks and network applications. Learning will take place through assigned readings including current issues and events in networking, class participation, and homework assignments. Grades will be based on examinations, homework assignments, and contributions to classroom discussions. For Information Systems Juniors and Seniors.

Prerequisite: 67-272

67-304 Database Design and Implementation

Spring: 6 units

This course provides an introduction to database design and implementation with a primary focus on the relational model. By the completion of this course the student will be able to appropriately use database design and implementation tools (the relational model, E-R models, normalization, and SQL) and apply knowledge of both technical and business issues related to database design and implementation to generate and evaluate alternate solutions to business situations. The course will also cover database dependability, reliability, availability, recovery, architectures, and distributed databases. Current topics in databases such as object-oriented and object-relational databases as well as data warehousing and data mining will also be presented. Projects will be completed using a "significant" relational database management system such as Oracle, DB2 or Microsoft SQL Server.

Prerequisites: 67-272 and 67-271

67-306 Special Topics: Management of Computer and Information Systems

Intermittent: 6 units

The course will provide a thorough understanding of the many responsibilities for managing technology by the organization IT resource, executives, managers, and functional end users. Concentration on IT plan and budget development with associated management, IT roles and responsibilities, system development and operations best practices, security management, IT procurement with emphasis on service and product agreements, vendor relationships, project management, and business continuity/disaster recovery. Junior or senior class standing is required. Coursework in information systems, software design, project management, or related job experience is strongly preferred, but not required due to the managerial, rather than technical, nature of the course.

67-308 Innovation Studio: Health Care Information Systems

Intermittent: 9 units

Healthcare information systems are intended to improve patient outcomes while reducing the cost of clinical care. However, with the highest per person healthcare expenditures, the United States ranks low in healthcare quality compared to other countries. Although healthcare information systems are improving, challenges persist because information workflow, human interface design, and interoperability are not emphasized. In this course, students will learn to solve real-world healthcare information systems challenges in a team-based format. Juniors and Seniors

67-309 Special Topics

Spring: 6 units

Special Topics: Information Assurance and Security [Power to the Edge: Challenges to systems survivability in a net-centric world] This course is an overview of increasingly important aspects of systems development, operation and sustainment, namely information assurance, software assurance, survivability and security. As more and more functionality and dynamic decision-making are pushed down and out into the organization (power to the edge), assurance and security concerns, with their organizational and human dimensions, impact the fidelity of the data and the very survival of the organization. Topics include overview and definitions, defense in depth, legal and policy issues, principles of survivability and information assurance, risk management, insider threat, vendor and outsourcing issues, incident management and forensics. This class is a combination of lectures, readings, and discussion groups. Students will leave the course with an understanding of the various concepts and their impacts on systems and the organization itself. Pre-requisites: Junior or Senior class standing and at least one programming course (15-110 or equivalent)

Prerequisites: 15-110 or 15-112 or 15-111 or 15-100

67-311 Database Design and Implementation

Intermittent: 9 units

Managing large databases is a core task in many information systems. In this class students will explore the underpinnings of databases as well as learn how to more effectively manage databases. Topics include relational algebra and advanced data modeling, advanced SQL queries, handling transactions, performance tuning, creating triggers, views and stored procedures, and much more. In the last part of the course we will explore NoSQL databases such as MongoDB and Redis, understanding their strengths and weaknesses as well as how to integrate them into web-based applications. Prerequisites: 67-272 or permission of instructor
Prerequisites: 67-272 or 67-371

67-312 Strategic Information Systems Management

Intermittent: 9 units

The primary focus of the course will be using Strategic Planning to develop greater alignment between Information Systems and the business, and thereby deliver greater benefit to the organization and foster excellence in the IS function. Set within the context of systems thinking, it will examine the purpose and nature of strategic planning and explore the use and value of different methods and models of strategic planning. The course will introduce students to elements of strategic IS planning including setting a strategic direction, management and measurement of performance, Enterprise Architecture and finance which define a planning framework that links investment in information resources to improved mission performance. Prerequisite: 67-373

67-313 Special Topics: Information Technology Audits and Controls

Intermittent: 9 units

This course introduces the fundamental concepts of the information technology audit and control function. The main focus of this course is on understanding information controls, the types of controls and their impact on the organization, and how to manage and audit them. The concepts and techniques used in information technology audits will be presented. Students will learn the process of creating a control structure with goals and objectives, audit an information technology infrastructure against it, and establish a systematic remediation procedure for any inadequacies. The challenge of dealing with best practices, standards, and regulatory requirements governing information and controls is addressed. Prerequisite: 67-272

67-315 Interaction Design for the Web

Spring: 9 units

This course explores the symbiotic relationship of design and technology. While both areas of inquiry have their own goals and concerns, meaningful products can result when design and technology are considered in unison. In this joint course between the faculty of Information Systems and School of Design, students will experience the design process from ideation to implementation on different digital surfaces. Students will develop abilities for employing research methods, forming a direction, usability testing, and creating technically sound and meaningful digital solutions. Prerequisites: 67-274 or 67-272

67-316 Human Computer Interface Design and Testing

Intermittent: 9 units

This course emphasizes team-based activities to promote engaged learning and application of user-centered design and usability testing concepts. Students who complete this course will have a good understanding of designing for user experience. The course emphasizes three themes and contexts for digital design and human-computer interaction (HCI): designing for the web, designing for mobile use, and multimodal interactive design. Students will also be exposed to a variety of usability testing methods with state-of-the-art tools such as Morae and Tobii eyetracker. Prerequisite: 67-272

67-317 Mobile Web Development and Usability Testing

Intermittent: 9 units

Designing for mobile web applications enables businesses to harness the explosive growth and new opportunities on the mobile internet, besides enabling innovation in many ways. This course emphasizes a 'mobile first' approach to responsive web design, development, and user experience. Students gain a deep understanding of the mobile web development process, the grammar of building mobile web sites, emerging web standards, and state-of-the-art mobile usability testing methods. They gain first-hand exposure to developing with HTML5 and CSS3 and applying heuristic methods and testing tools such as Morae and Tobii eye tracker, to achieve an enhanced mobile user experience. Recent reports state that 80 percent of mobile websites in the US get traffic from other regions of the world. The course will address the need for facilitating a 'global' user experience, through independent student projects that target a 'global or social' theme and deliver a complete solution involving design, development, and usability testing of a localized and responsive web site. Prerequisites: (15-121 or 15-122) and 67-272

67-318 Business Process Modeling and Implementation

Intermittent: 9 units

This course focuses on concepts, techniques, and tools for modeling, executing, and managing business processes. Structured along the phases of the business process management lifecycle the course starts by introducing different languages and tools for business process modeling. Then, it presents techniques and tools for implementing, automating, and executing businesses processes such as the use of BPM systems or workflow systems. The course also covers further aspects of business processes such as monitoring and simulation. Moreover, it will present several real-life business processes such as order-to-cash or make-to-order. Prerequisites: 67-272 or 15-210

67-319 Global Technology Consulting Groundwork

Spring: 3 units

This course is by invitation only for participants in the Technology Consulting in the Global Community program. For information on the program and how to apply, see <http://cmu.edu/tcing>.

67-321 Social Informatics

Intermittent: 6 units

Social informatics refers to an interdisciplinary study of the design, use, and effects of information and communication technologies (ICTs). Rather than evaluate the social impact of these technologies, social informatics focuses on how cultural and institutional contexts shape the character of technology. Conversely, social informatics is also concerned with how technology influences culture, affects power relations and restructures social and organizational networks. In this seminar, we will use critical discussion and debate to explore the effects of different types of information systems in diverse communities and contexts - from mobile devices to Twitter, from professional to personal life, from emergent nations to your hometown. Students will go beyond the technical aspects of computing and build an understanding of the political, economic, and social considerations that underlie technological development and ethical responsibilities.

67-323 Enterprise Systems: Concepts and Practice

Intermittent: 9 units

Enterprise systems are the trend of software today in the industry. By integrating various functions of an enterprise, Enterprise systems improve the performance of business processes. This course discusses role and function of Enterprise resource planning (ERP) systems; how they fit into an organization; analyzing business processes and ERP implementation; the ethical, global and security issues of ERP implementation; hand-on use of ERP software; ERP vendors and industry trends are also studied. Software practice and ERP case analysis are required. Prerequisite: 67-272

67-324 Accelerating Innovation and Entrepreneurship

Intermittent: 9 units

Mastering innovation processes and incorporating entrepreneurial methods into one's career is a cornerstone of success. Whether one endeavors into a startup or large company, successfully incorporating innovation and entrepreneurship will propel a career in software development, consulting, financial services, and many others. Innovation and entrepreneurship is a discipline with established tools and methods that must be properly harnessed. This course will expose and educate students to the discipline of innovation and entrepreneurship that will be portable to most any career and industry focus. This course is open to Juniors and Seniors.

67-327 Web Application Security

Intermittent: 6 units

This is a technical course designed to help students learn how to exploit web applications and to be better able as developers to defend against such exploits. The course covers the process of hacking a web application, starting with initial mapping and analysis, followed by identifying common logic flaws in web apps, database and network exploits, command and SQL injections, and the like. This hands-on course requires students to be familiar with a popular web application framework or language (such as Ruby on Rails, PHP, Django/Python, ASP.NET or the like). Prerequisite: 67-272 or permission of instructor. Prerequisite: 67-272

67-328 Mobile to Cloud: Building Distributed Applications

Fall: 9 units

Web 2.0, Mashups, Mobile Apps, and Cloud Computing are just a few of the new terms people are using to describe emerging technologies for building complex, distributed applications. Protocol standards, web services, open-APIs, increasingly more powerful mobile devices, and the Internet have enabled new possibilities for weaving complex applications using globally-distributed data and computing resources. Application development has largely left any single computer, and is distributed across a wide range of hardware and software platforms. This class will explore these developing technologies and models for structuring their complexity, while building projects that go from mobile to the cloud. Prerequisite: 67-272 (with "C" or higher) or permission of instructor.

Prerequisite: 67-272 Min. grade C

67-329 Contemporary Themes in Global Systems

Intermittent: 9 units

Globalization and outsourcing of information systems (IS) is a mainstay of the business environment. The decision to outsource software services to providers in distant places has many risks and thus careful management of critical success factors is essential. Likewise, products and services are being developed and delivered by teams of people in diverse locations working together. Management of these sourcing models and human capital relationships will be an increasingly important skill for students expecting to fully participate in the emerging IS marketplace of the 21st century. This course introduces the effective fundamentals of global project management and the mechanics of sourcing arrangements including offshore outsourcing. Students will also examine the effects of human diversity and cross-cultural considerations in the creation, use and management of information systems. A combination of readings, participation in class discussions, and non-technical collaborative projects will be expected of class participants. Students must have sophomore standing or higher.

67-330 Technology Consulting in the Community

Spring: 9 units

In this course, the student develops technical consulting and management skills while collaborating on-site with a community leader of a non-profit community organization or school. This service-learning course has students analyze a complex organization, then design and implement a work plan that will expand the organization's capacity to use information technology. Student consultants do not merely provide IT support, nor do they focus on system development. Rather they focus on solving organizational problems using IT solutions. In doing so, they may develop a system, or adapt open source or commercial tools as appropriate to the situation. Throughout the semester, students develop a consulting report. They learn how to use this working document to collaborate with others and to think through and communicate a strategic technology plan. Students also experience how urban community organizations function, seeing the valuable benefits these organizations provide to society. Prerequisites: 76101 and (15121 or 70451) At least sophomore standing.

Prerequisites: 70-451 or 15-122 or 15-121

67-331 Technology Consulting in the Global Community

Fall: 3 units

This course is by invitation only for participants in the Technology Consulting in the Global Community program. Admitted ONLY BY Permission of Instructor

67-340 Mobile Web Design & Development

Spring: 9 units

This course introduces students to mobile web design and development. Students will learn the concepts and techniques of mobile web design and develop a working application using HTML5, CSS3 and Javascript. The course utilizes a hands-on approach to guide students through learning and understanding the design and development process.

Prerequisites: 15-104 Min. grade C or 15-112 Min. grade C

67-344 Organizational Intelligence in the Information Age

Fall: 9 units

Across all organizations people find that the actions they take affect, and are affected by, the technology, norms, procedures, culture, and members of the organization. In order to navigate through this organizational world, agents need a better understanding of social and organizational intelligence. How do organizations (and the people who populate them) acquire and then process information? In what ways have new technologies affected the norms, procedures, and culture of organizations? How do leaders successfully guide their organizations through a world where new information and new technologies are constantly being produced? This course is about information assessment and analysis in organizations, and the way organizations are transformed by technology. This course is for Sophomores, Juniors, and Seniors.

67-352 Electronic Business

Intermittent: 9 units

The objective of this course is to give students a good understanding on how e-business is conducted and managed including opportunities, limitations, issues, and risks. E-business applications require certain technological infrastructures and other support mechanism in areas of business-to-consumer, business-to-business, and consumer-to-consumer. Topics will cover the technologies, skills and business concepts that surround the emergence of electronic business and the impacts of applying these information technologies to different commercial processes from both an operational and strategic perspective. The course will also explore the problems surrounding electronic business such as security, privacy, intellectual property rights, legal liabilities and global issues. The course provides a contemporary exposure to concepts and practices associated with a new and dynamic digital environment in the real business world. The information technologies associated with the delivery of Internet sites as well as internal operations will be discussed. After completion of this course, students are expected to have appropriate level of knowledge, skills, and concept of the digital operations in a modern business world.

Prerequisites: 67-371 or 67-272

67-353 IT & Environmental Sustainability

Intermittent: 6 units

Sustainable living and sustainable development are serious challenges facing individuals, communities, organizations and countries around the world. Addressing these challenges is a multidisciplinary effort. In particular, while Information and Communications Technologies have been among the most transformative developments in recent decades, they have the potential to address some of society's most urgent needs. For examples, intelligent use of IS/IT can help enable smarter cities, more efficient transportation systems, smarter energy systems, more efficient logistics and 'greener' product life cycle design. In this course, students will reflect on the challenges of sustainability and the potential role IS/IT may play in enabling adaptation and mitigation of these challenges.

67-354 Information Systems and Sustainability

Intermittent: 9 units

Environmental, economic, and societal challenges are affecting the sustainability of many communities around the globe. Given its multidisciplinary foundation, IS presents an important potential for enabling adaptation and mitigation to these challenges. IS innovation could also play a prominent role in transforming unsustainable problem spaces into sustainable and resilient systems. What is needed is sustainability minded IS professionals to lead such transformation. This course introduces students (future IS leaders) to the fundamentals of sustainability in the 21st century. It includes topics on Green IS, Smart Cities, and the Information Economy. The course invites students to proactively reflect on sustainability issues and their effects on policy and leadership. In such reflection, students are encouraged to consider various case-based scenarios where they evaluate challenges to sustainability and developed innovative, strategic, practical, and rigorously supported IS based solutions.

Prerequisite: 67-272

67-356 Design for Behavioral Change

Intermittent: 9 units

Our behaviors are influenced in large part by the built world around us. Information, devices, physical environments and architectures all contribute to our decisions from what we consume to how we participate as citizens. Designers and technologists have a more direct hand in how our world takes shape and subsequently on people's actions. In this studio, we employ a variety of human-centered design methods to shape information, products, interactions, and environments, then test and iterate those ideas in a variety of contexts. We will practice a few of the ways designers act as agents of positive change for individuals, communities, and the environment.

Prerequisites: 51-261 or 67-265

67-357 Healthcare Analytics and Big Data

Intermittent: 9 units

The objectives of this course are: (1) to provide a sound understanding of how healthcare analytics helps to re-engineer the complex processes that drive return on investment and lower medical costs and (2) how the big data revolution is accelerating value and innovation in healthcare. Topics in healthcare business intelligence (BI) to be covered include how data quality and data governance improve the quality of healthcare, architectural implications of BI, technology management, and how BI facilitates evidence-based medicine and effective clinical decision support. Besides gaining hands-on lab experience with BI technologies and tools used in real-world healthcare organizations, students will also work on a group project to understand better the challenges that big (and unstructured) data present to traditional clinical database systems.

Prerequisites: (67-250 or 70-451) and 15-121 and 36-201 and 67-272

67-358 Technologies in Service Design

Intermittent: 9 units

This course is offered only at Carnegie Mellon's campus in Qatar. The course looks at designing services within systems, the process of designing human ecologies with technology products, e.g., redesigning the EC entrance gate, shaping patient experience at the hospital, or anywhere in between. Deliverables could include ambient devices, apps, wearables, embedded technologies, or other things along user pathways, all determined by the research insight.

Prerequisite: 67-272

67-359 Design Fundamentals II

Spring: 9 units

This is a course study in communication design, data presentation, organization, visual hierarchy, messaging, and design production. Students explore and develop skills in the organization of qualitative and quantitative data and structure of information for strategic purposes. Projects hone component skills in production and presentation for screen using grids and appropriate typography. Incorporates basic multilingual production.

67-360 Applied Analytics

9 units

Businesses and organizations are currently in a paradoxical situation where they are drowning in data but starving for knowledge. From tracking purchases at traditional retail stores to logging browsing patterns at online stores, modern business are adept at collecting data about their customers. The analytics challenge is how to interpret and distill this data into actionable knowledge. This class will introduce you to a range of technologies and methods for extracting business intelligence from data to anticipate customer needs and create new opportunities. We will examine how various business processes can be improved with case-studies and examples from the fields of fraud detection, movie-box office, credit scoring, customer churning and retention. These are some of the analytic strategies used by companies such as Google, Amazon, Netflix, and Facebook to better understand and target their customers. The overall objective of this class is to introduce you to practical business analytics skills which are in high demand in the current job market. The class will be hands-on with various analytics tools such as the SAS Enterprise Miner. This course may count toward the Decision Science and Rational Choice (old curriculum) and Quantitative Analysis and Research Methods (new curriculum). Students could also use it as an IS elective for the professional core or content area (Quantitative Analysis and Research Methods). Prerequisite: 15-121 or consent of the instructor.

Prerequisites: 15-211 or 15-122 or 15-121 or 15-111

67-361 Big Data & Sustainability

6 units

Sustainability is one of the greatest global predicaments now facing us. Symptoms abound: climate change, depletion of water resources, deforestation, pollution, and on and on. There are no easy answers to these problems. Even framing the relevant questions is difficult. Choosing between competing alternatives runs the risk of addressing one problem at the expense of another. Only through thoughtful and careful analysis can informed, robust and helpful strategies be developed. Massive amounts of data are now available in a range of domains, e.g., telemetry, energy consumption, traffic patterns, healthcare etc. As a new resource, 'Big Data' is differentiated from traditional data by its volume, velocity, and variety. The dual combination of Big Data and technological advances in the general field of analytics and data mining currently provide an opportunity to potentially answer heretofore inaccessible questions. In the domain of sustainability, advances in sensor technology, metrology, physics based modeling, epidemiology, and ecological sciences provide an explosion of data yet to be mined. Relationships among these apparently disparate data sources have yet to be established and leveraged. In this introductory course, students will gain exposure to sustainability. We will then examine some classical analytic techniques and their limitations for the nature of problems related to sustainability. We will tie these two themes of the course together by exploring contemporary Big Data approaches to the intractable problems of sustainability. Units include: 1. Background on the problem domain (Sustainability); 2. Overview of classical Data Analytics and their limitations; 3. Introduction to Big Data and associated platforms (e.g. Apache Hadoop, IBM Watson); 4. Exploring the potential of Big Data approaches to the problems of Sustainability. For Juniors and Seniors or by instructors approval

Prerequisites: 15-112 Min. grade C and 36-201 Min. grade C

67-362 Big Data and Analytics

Spring: 9 units

Massive amounts of data (terabytes and beyond) are available in a range of domains: commerce, finance, healthcare, social media, real-time process monitoring, etc. This course is an introduction to the techniques and tools for analyzing and distilling actionable knowledge from data. Sophomores, juniors and seniors.

Prerequisites: 36-201 Min. grade C and 15-112 Min. grade C

67-364 Practical Data Science

Spring: 9 units

From empirical, to theoretical, to computational science, we are at the dawn of a new revolution—a fourth paradigm of science driven by data. Like archaeological remnants, data, by its very nature, is a marker of what happened in the past. How can data be used to better understand this past and what is happening in the present? How can data be leveraged to forecast what will happen in the future? Better still, how can data be used to mold what should happen in the future? In this course we will study descriptive, predictive, and prescriptive methods by which data can be used to gain insight and inform actions of people and organizations. The real excitement of data science is in the doing. This is an application oriented course requiring skill in algorithmic problem solving. We will use Python based data science tools. While prior programming experience with Python will be helpful the course will strive to be self-contained. If you have not programmed in Python before, you need to be comfortable programming in some language (e.g., Ruby, R, Java, C++) and will need to come up to speed with the Pythonic way of problem solving.

Prerequisites: 36-201 Min. grade C and 15-112 Min. grade C

67-370 Intelligent Decision Support Systems

Spring: 9 units

In this course we will study various methods for augmenting human decision making. We will focus on the key ideas of several business intelligence technologies and the value they can bring to an enterprise. The technologies we will study include classic symbolic AI methods (rule-based systems, case-based reasoning), connectionist approaches (neural nets), evolutionary approaches (genetic algorithms), inductive approaches of machine learning (nearest neighbor, support-vector machines), data mining (constructing decision trees and association rules), and collective intelligence methods (collaborative filtering). While this is not a programming intensive course, we will be using several software systems and libraries implementing these methods. By running experiments with these systems and libraries we will focus on how these technologies can support decision making in tasks such as classification, clustering, prediction, optimization, design, and recommendation. This course may count toward the Decision Science and Rational Choice (old curriculum) and Quantitative Analysis and Research Methods (new curriculum). Students could also use it as an IS elective for the professional core or content area (Quantitative Analysis and Research Methods).

Prerequisite: 15-121

67-371 Fundamentals of System Development

Fall: 9 units

This is an introductory course in software systems analysis and design and project management. The course will cover contemporary themes and issues involved in developing high quality software systems that meet users' expectations. Students will learn the basic theory, techniques and skills that systems analysts need to develop and document requirements and project plans for complex information systems projects. Since software system development practice is a rapidly evolving area, a cross-section of current, as well as time tested best practices methods will be presented. The course consists of these main components: overview of systems analysis and design, lifecycle and process issues, requirements articulation with use cases, object models and diagramming and documentation tools and techniques, and project management, including issues of software quality and metrics. Concepts will be mastered through a combination of assigned readings, class attendance, homework assignments and mini-projects. This course is a professional core requirement, and is open only to IS juniors who have completed 67-272.

Prerequisite: 67-272

67-372 Principles of Database Systems

Fall: 9 units

Building upon prior exposure to data modeling, students will study in depth principles of database management systems, their design, and development. NoSQL alternatives to the relational model will be motivated and studied. This course is a required professional core course and is open only to juniors in the IS major who have completed 67-272.

Prerequisite: 67-272

67-373 Software Development Project

Spring: 12 units

In this course, students design and implement a usable information system for a client. The client may be affiliated with the university, government, business, or non-profit agency. Students will be assigned to teams to work on these projects, and will produce operational, fully documented and tested, computer-based information systems. The projects will be supervised by CMU faculty and, when possible, by project clients.

Prerequisite: 67-272

67-379 Principles of Geographic Information Systems

Intermittent: 9 units

This course is only offered at Carnegie Mellon in Qatar. It is often said that a picture is worth a thousand words. This is particularly relevant to the current information age. We have an ever-growing wealth of data that could uncover great benefits if properly visualized. Much of the data which we generate and utilize hold geographical aspects. Demographic, health, education, environment, resource, crime, transport, economic, and development data could be effectively represented through Geographic Information Systems (GIS). GIS provide the necessary tools to analyze and visualize data in order to uncover relationships that are not readily apparent. This holds a great potential for improved planning, communication, and decision making, leading to positive social and organizational implications. To harness such potential, this course introduces students to the basics of GIS through theoretical and practical sessions aimed at establishing fundamental GIS understanding and skills.

Prerequisite: 67-272

67-381 The Designed World

Fall: 9 units

This is a seminar course based on rhetorical inquiry into the nature of the designed world, how to analyze it, how it's built, and the values that shape it. Surveying design across its many forms, this reading- and writing-intensive course develops critical thinking on how we design information, products, technology, physical space, services, public policy, as well as inquiry into emergent human ecologies and whole earth systems. Offered only on the Qatar campus.

Prerequisite: 76-101

67-390 Independent Study in Information Systems

Fall and Spring

Independent studies are opportunities to engage in research with an IS faculty member to advance your learning in certain areas of interest. Information Systems students may enroll in independent study for 3, 6, 9, or 12 units of academic credit by obtaining an IS faculty sponsor who will oversee the academic component of the coursework, monitor progress, and assign a final grade.

67-440 IDEATe Mobile Application Design & Development

Spring: 9 units

TBD

67-442 Mobile Application Development in iOS

Intermittent: 9 units

This course provides students with the concepts and techniques to design and develop mobile applications with iOS and to understand the design and development process involved. Students will develop a series of smaller iOS applications in weekly lab sessions as well as larger application as part of a course project. In the process of developing these applications, students will develop a strong understanding of the Swift programming language, iOS application development, mobile-centered design, and how to ensure technical quality in software development. This course is open only to juniors and seniors in the IS major who have completed 67-272.

Prerequisite: 67-272

67-474 Tech Startup Launchpad

Spring: 9 units

This course provides hands-on learning about what it is like to start and launch a technology startup company. You will work within a team of students to turn your idea into a real company. You will learn and apply modern concepts practiced today in top innovation hubs around the globe: lean startup, minimum viable product, customer development, product-market fit, agile product development, business model generation, competitive landscape, etc. The goal of this course is not to write a business plan, prepare a venture capital presentation, or write tedious progress reports. You will learn what it takes to quickly develop your idea into a prototype, turn it into a minimum viable product and launch it, while you concurrently 1) talk to and cultivate potential customers, and 2) develop and iterate on your business model. This course is designed for BA, CS, IS seniors; non-IS seniors should obtain instructor permission to enroll in this class.

Prerequisite: 67-272

67-475 Innovation in Information Systems

Fall: 12 units

In this capstone team-based course, IS seniors design and implement an information systems solution to meet a real-world need or opportunity. Innovation, entrepreneurship, planning, project management, and risk taking will all be emphasized. Students will be challenged to produce "proof of concept" systems or prototypes that are fully documented, tested, and ready to present for external evaluation. This course is a required professional core course and is open only to seniors in the IS major who have completed 67-373.

Prerequisite: 67-373

67-490 Practicum in Information Systems

Intermittent

This course is offered only at Carnegie Mellon's campus in Qatar. The practicum in information systems allows students interested in applying skills acquired in the field of information systems in the context of a working environment. Students will complete a project and be accountable to a stakeholder that is external to their program of study. They may shadow and observe practices in the field of information systems, and also perform tasks as assigned. A hands-on experience is expected. By completing this course, students practice desirable skills for employability, such as time management, project management, team work, and professional development.