The Major in Information Systems Courses

About Course Numbers:
Each Carnegie Mellon course number begins with a two-digit prefix that designates the department offering the course (i.e., 76-xxx courses are offered by the Department of English). Although each department maintains its own course numbering practices, typically, the first digit after the prefix indicates the class level: 1xx courses are freshmen-level, 2xx-3xx courses are sophomore level, etc. Depending on the department, 6xx courses may be either undergraduate senior-level or graduate-level, and 7xx-7xx courses and higher are graduate-level. Consult the Schedule of Classes (https://enr-apps.as.cmu.edu/SOCServlet/) each semester for course offerings and for any necessary pre-requisites or co-requisites.

67-100 Information Systems First Year Colloquium
Fall: 1 unit
This IS Colloquium will provide a broad introduction to the Information Systems Program, an exciting program newly joint between Carnegie Mellon’s Dietrich College and Heinz College. The IS Colloquium is open only to first-year IS students and is led by an IS academic advisor who facilitates discussions on the field of IS, the program curriculum, and careers, in addition to co-curricular experiences such as internships and study abroad. To explore their own interests, we place an emphasis on highlighting a variety of areas within the field of IS. Guest lecturers will include leaders in IS research including Dietrich and Heinz faculty and IS alumni. Additional speakers include the IS career consultant and various campus representatives. Discussions will include students’ progress in their first semester, as well as guidance in course planning, creating student Spring semester class schedules, and their overall four-year plan.

67-204 Blockchains in Industry
All Semesters: 3 units
Industry experts characterize blockchains as breakthrough technology that has the same transformative power as that of the internet. Blockchains have the potential to solve a variety of problems that benefit from a decentralized model of trust. This course will help students understand fundamental blockchain concepts and develop industry case studies of blockchain applications to finance, insurance, energy, healthcare, real estate, etc.

67-211 Business Oriented Sys:History, Des & Dev-Lens of CoBOL Programming Language
Fall: 6 units
Using computers to process business information began in the early 1960’s. This course examines the technology evolution of business systems from the basic transaction processing of early business systems to today’s event-driven, web-based, big data systems. Students explore the unique aspects of business systems such as longevity, maintainability, good information reporting practices, and development methods. Lecture material includes important historical milestones, business systems terminology, and business oriented problem-solving approaches. Students will apply lessons learned in the lectures to programming assignments where they will gain a practical understanding of data representations, persistent storage structures, and algorithms common to business systems. The programming assignments use CoBOL, a standardized language designed for business systems development. Some minimal programming experience in any language 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 will 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 the enterprise and the means by which these systems are created, utilized and maintained. The course will focus on enterprise information architecture including the components of enterprise strategy, business, application, information, and infrastructure layers. This course provides not only a framework for understanding information systems, but also a language to identify their dynamic complexities and interdependencies.

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

67-265 Design Fundamentals: Shaping Interactions and Experiences
Fall: 9 units
The course introduces students to human-centered compositional practices that attract users to the pre-task environment/interface and invite them to stay. Once attracted, users need a useful, usable, and desirable task environment that is developed by exploring color theory, basic typography, and meaning-making through image, word, and typography resulting in collaborative meaning between the three. With this knowledge in hand, students design and prototype an interactive solution to a problem that real users face, employing user studies and usability testing in order to create an effective solution.

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**

Intermittent: 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.

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

Spring: 6 units  
The course provides the overall knowledge of how Information Technology departments are managed in organizations of all sizes. It is about the technology people, the necessary best practice processes, and how innovation occurs transforming organizations in the way they operate and compete.

**67-309 Special Topics: Information Assurance and Security**

Fall: 6 units  
Special Topics: Information Assurance is an introduction course for Information Systems students that focuses on information security concepts. This course will be a broad introduction to many aspects of information security that affect computer systems, your everyday life on the internet, your activities - and those of others, and the practices of all organizations using and building information systems. You will learn an introduction to the practice of securing information systems, how organizations manage risk to their information assets, what threats there are to the security of an information systems, strategies for organizational resilience, applicable US cyber laws, and how organizations respond to real incidents. You will hear about some of the major cyber incidents that have shaped the way security is performed by organizations on the internet today, and you will participate through class discussions and homework analyzing important recent cyber issues, real incidents, and internet-scale events. By the end of the class you will be able to analyze systems for security using the language of security professionals and analyze the implications of real world attacks on security systems by applying core information security concepts.

Prerequisites: (15-112 or 15-110) and 67-250

**67-315 A Web For Everyone**

Intermittent: 9 units  
This course provides a strong foundation in user-centered design and the engineering of web accessibility. The student will gain expertise in methodologies and tools for designing, prototyping and evaluating a web site ensuring that the content is equally accessible to people with disabilities. Upon successful completion of this course, the student will be able to discuss standards and metrics for use in web development projects and be proficient in different stages of the project life cycle including data gathering methods, analysis techniques, requirements specifications, application of universal design principles, prototyping, and testing for usability and WCAG (Web Content Accessibility Guidelines) compliance. A term-long individual project will involve analysis of an organization's website for compliance with WCAG 2.1 guidelines, design and development of an improved prototype, and usability studies of the prototype.

Prerequisites: 67-272 or 67-240

**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/tcingc/.

**67-324 Accelerating Innovation and Entrepreneurship**

Fall: 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 in order to translate ideas into commercial successes. 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. After the completion of this course students will be able to understand and differentiate among ‘right sized’ innovation and entrepreneurial methodologies.

**67-327 Web Application Security**

Fall: 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). Prerequisites: 67-272 or permission of instructor.  
Prerequisite: 67-272

**67-329 Contemporary Themes in Global Systems**

Fall: 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.

**67-331 Technology Consulting in the Global Community**

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

**67-338 Information & Grid Design**

Fall: 9 units  
Whether you create, oversee, or want practice in solving problems through grid systems for websites, responsive applications, slide presentations, or data visualizations, this course provides the skills needed to communicate using the interplay of image, text, and typography in grid environments.

**67-346 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 or 36-200 Min. grade C) and 15-112 Min. grade C
67-373 Information Systems Consulting 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

67-390 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. This is available by Special Permission.

67-391 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, 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

67-443 Mobile Application Design and Development
Fall: 12 units
This course provides students with the concepts and techniques to design and develop innovative mobile applications. Students will develop a series of smaller mobile applications in weekly lab sessions (using either iOS or Android frameworks). In addition, student teams will build a larger mobile application, as part of a semester-long project, that fills a demand not effectively met in the current market. In the process of developing these applications, students will gain a strong understanding of mobile application development, mobile-centered design, the process of creating and testing innovative application design, and larger principles of software engineering. In weekly labs, students can choose either the Swift/iOS or Kotlin/Android track to complete course work, but lectures will primarily use Swift to illustrate larger points of software architecture and engineering. This course is open only to juniors and seniors in the IS major who have completed 67-373 or by special permission of the instructor.
Prerequisites: (67-373 and 67-272) or 95-712

67-445 Seminar in IS: Intelligent Agents
Spring: 9 units
The purpose of this seminar is to study behavioral interactions with and perceptions of intelligent agents. This research seminar is intended for junior and senior students in Information Systems and other university departments who wish to engage in research at the intersection of Information Systems, Artificial Intelligence, and Psychology. All students are expected to have some prior knowledge in Statistics (36-201 or 36-309 or similar courses). For each topic, students will be reading, analyzing, discussing, and presenting several papers. This discussion-based course has two main objectives: 1) to facilitate in-depth discussions of current research articles and essential topics in this domain, and 2) to build and expand students’ research skills through in-depth analysis of papers, critiques, presentations and discussions.
Prerequisites: 36-201 or 36-309

67-476 Innovation in Information Systems: Health Care
Spring: 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