

# COMPUTER SCIENCE/INFO. SYSTEMS (CIS)

---

## **CIS 1001 - Computer Science Principles (Foundations : VFMA - Mathematics) - 4 cr.**

Focuses on engaging students in activities that show how computing changes the world. By learning the central ideas of computer science and computational thinking, students will learn to be creative, collaborative, and innovative in developing technical solutions to problems. The course includes learning to create mobile apps to solve those problems, examining how computing has impacted society, and analyzing large data sets.

## **CIS 1205 - Technology Ethics - 4 cr.**

Examines ways technology challenges traditional ethical, legal and social concepts. This includes issues generated by the use of computers and computer networks, including the Internet and the World Wide Web.

Topics for consideration include: privacy, security, computer crime, software piracy, copyrights, intellectual property, free speech, access to information/ censorship, Ecommerce, computers and gender and civil liberties in cyberspace.

## **CIS 1777 - Independent Study - 0-4 cr.**

Addresses a special need, interest or opportunity and are not a part of the regular curriculum.

## **CIS 2011 - Computer Architectures - 4 cr.**

Introduces computer architecture, students discover how computers are designed and built as well as how they execute programs. By investigating the mechanism and components of computing, the principles of their operation and the relationship between software and hardware, students formulate an understanding of the basis for current design and enterprise architecture.

**Prerequisite Courses:** CIS 1001

## **CIS 2085 - Programming I with/Java - 4 cr.**

Introduces object-oriented programming using the Java language, a cross-platform Internet programming language. The course examines the nature of programming and its use in solving problems. Students learn to read and write programs using standard programming structures, including input/output, control statements, loops and methods.

## **CIS 2087 - Programming II w/Java - 4 cr.**

Continuation of object-oriented programming. The course deals with problems involving arrays and teaches techniques and methods to handle files and structures. This course expands on the object concepts introduced in CIS 2085.

**Prerequisite Courses:** CIS 2085, C or better in CIS 2087.

## **CIS 2777 - Topics - 0-4 cr.**

Addresses a special need, interest or opportunity and are not a part of the regular curriculum.

## **CIS 2999 - Independent Study - 1-4 cr.**

Selected area of interest on which to concentrate.

**Prerequisite Courses:** consent of instructor.

## **CIS 3005 - Data Storytelling: The Ethics and Aesthetics of Data Visualization - 4 cr.**

Explores the fundamental building blocks of powerful data visualization and the tools and experience needed to create them. Examines the influential data visualization from the past and present along the methods used to critique these works. This includes the ethical issues and bias revolving around data visualizations and the use of data to tell stories from a particular point of view. The course will introduce students to practical applications using current data management and visualization software.

**Equivalent Course:** ART 3005

## **CIS 3034 - Client-Side Web Development - 2 cr.**

Provides an introduction to creating web applications with a rich client-side interface. The course focuses on the use of standards-compliant programming techniques and innovative approaches to user experience design. Gives students practical experience in working with current and emerging web technologies for the client-side of applications.

**Prerequisite Courses:** CIS 2085 or consent of instructor.

## **CIS 3089 - Data Structures and Algorithm Analysis - 4 cr.**

Studies fundamental concepts of algorithm analysis and the specification and implementation of data structures and data types are introduced. Topics include linked lists, stacks, queues, binary search trees, sorting, searching and graphs.

**Prerequisite Courses:** C or better in CIS 2087.

## **CIS 3107 - Database Modeling - 4 cr.**

Provides an understanding of fundamental concepts in the management of data, hands-on experience with a small-scale database management system, and an awareness of the application of business data base management systems. Lab exercises involve use of a relational DBMS to load, update and retrieve information from a database.

**Prerequisite Courses:** CIS 1001

## **CIS 3108 - Systems Analysis and Design - 4 cr.**

Focuses on the five phases of the systems development life cycle. Topics include: preliminary investigation, physical and logical documentation, detailed investigation of requirements and alternative specifications, analysis and design techniques, implementation considerations, development of logical and physical data flow diagrams, data modeling, prototyping, CASE tools and the use of Gantt and PERT charts. A sample project is introduced and is integrated using the SDLC methodology.

**Prerequisite Courses:** CIS 1001

## **CIS 3115 - Machine Learning for Data Science (Integrations : VINS - Natural Science) - 4 cr.**

Explores how machine learning algorithms are applied to data science problems. This includes examining how data is used within the scientific method to justify hypotheses, but also how poor data can result in machines the discriminate against some populations. Students will look at a wide range of classification and regression problems from business, healthcare and the arts. Students will implement machine learning algorithms using current tools that require minimal programming and learn to analyze and visualize data and write clear descriptions of their processes and analysis of their work.

**CIS 3205 - Information Systems - 4 cr.**

Explores the ways computer-based information technologies and systems are used to address specific organizational needs. Students will become familiar with the terms, concepts, and issues in information technology management; become involved in the process of developing and modifying information systems which support crucial problem solving and decision-making in organizations; and conduct data analysis using common techniques.

**CIS 3230 - Game Design and 3-D Modeling - 4 cr.**

Introduces the diverse tasks required for 3-D game development. An overview of the game design industry and game development processes lead to development projects that use leading development tools. Sophisticated 3-D models are created using modeling software and incorporated into the development projects. Assessment is based on student's understanding of the methodologies, use of the development tools, and aesthetics of the designs.

**Prerequisite Courses:** CIS 2087

**CIS 3285 - Software Design - 4 cr.**

Introduces software engineering and the processes for building software systems. The course examines the software lifecycle and the methods used to manage software projects. Students learn to create software designs from user requirements using UML, convert these design into software, and test and maintain this software. Since software design entails significant interactions between parties, people management and team management methods are explored including analysis of the ethical implications of the software design process.

**Prerequisite Courses:** CIS 2087

**CIS 3287 - Software Quality Assurance - 2 cr.**

As our society's dependence on software grows, so does the importance of software quality. Software failures can have catastrophic effects on companies and people. In this course, students learn the principles of Software Quality Assurance, how to write test plans, and how software quality fits into a project's development methodology.

**Prerequisite Courses:** CIS 2085

**CIS 3334 - Mobile Device Programming - 4 cr.**

Develop applications for a variety of resource constrained devices such as cellular phones, pagers and personal digital assistants (PDAs). Students will explore the creation of graphical user interfaces, data storage, network access and game development. Activities include creating applications for mobile devices using both high-level and low-level industry standard interfaces and developing a distributed application over a wireless network.

**Prerequisite Courses:** CIS 2087

**CIS 3542 - Emerging Technologies in Information Systems - 3 cr.**

Allows students to research an emerging technology in the Information Systems field. The student will present a proposal, research, and implement an emerging technology and demonstrate a working project. Research and project management skills will be enforced.

**CIS 3777 - Topics - 0-4 cr.**

Addresses a special need, interest or opportunity and are not a part of the regular curriculum.

**CIS 3999 - Independent Study - 0-4 cr.**

Independent Study.

**CIS 4034 - Server-Side Web Development - 4 cr.**

Provides an introduction to web site administration and the use of a web development IDE for the creation of database driven web applications. The course focuses on server-side programming and database access for web applications; giving students practical experience with current development environments. Pre- or co-requisite: CIS 2087 and CIS 3107 or consent of instructor.

**Prerequisite Courses:** CIS 2085

**CIS 4041 - Web Design - 4 cr.**

Explore the design principles that characterize successful Web sites and use modern tools for creating Web sites. Design issues will include the differences between print and electronic media, working within the limits of the technology, and how the user's contexts and goals affect Web design. Web sites will be critiqued from both an aesthetic and functional standpoint and students will be required to design and build fully functional Web sites.

**Equivalent Course:** CME 4041

**CIS 4042 - Computer Security - 2 cr.**

Overview of different computer security threats and measures that can be taken to make computers more secure. Hands on experience with a wide range of security techniques will be used to show the various threats to computer systems. Both technical and management solutions to security problems will be discussed. Student will be required to sign a code of conduct at the start of class given the sensitive nature of the material covered. This course will attempt to cover the major aspects of security including: risk management, access control, security architecture, physical security, telecommunications security, cryptography, business continuity, and disaster recovery.

**Prerequisite Courses:** CIS 2011

**CIS 4108 - Project Management - 2 cr.**

An introduction to project management and the supporting techniques and tools. The course exposes students the project management process, the deliverables produced while managing a project, and the collaborative nature of the project environment.

**CIS 4109 - Capstone Project - 4 cr.**

An in-depth systems development lifecycle practicum. Students work in teams to analyze, design, implement and document a complete information system. Most projects come from systems design requests from the local community.

**Prerequisite Courses:** CIS 4108

**CIS 4115 - Artificial Intelligence with Robotics - 4 cr.**

Gives students an in depth understanding of modern artificial intelligence methodologies, techniques, tools and results. Students learn the theoretical and conceptual components of this discipline. Topics covered: history of AI, search techniques, knowledge representation, reasoning, natural languages, machine learning, robotics, neural networks and expert systems. Students implement the above topics by means of computer programs written in laboratory. Interactions between artificial intelligence and other disciplines will be explored.

**Prerequisite Courses:** CIS 2087

**CIS 4200 - Full-Stack Web Development - 4 cr.**

Provides an introduction to creating and administering web applications with a rich client-side interface, database access, and standard server-side programming techniques. Students gain practical experience in working with current and emerging web technologies.

**Prerequisite Courses:** CIS 2087 and CIS 3107 and CIS 4041

**CIS 4444 - Research Project - 1-4 cr.**

(1) Design and carry out their own research project in an area of special interest or (2) participate in an ongoing research project developed by a faculty member. For student-initiated projects, the student develops the research proposal, conducts the research and reports the research in standard APA format. For faculty-initiated research, students work one-on-one with the faculty member as part of his/her research team of students. Students will present the results of their research to other CIS students and faculty.

**CIS 4555 - Systems Development Internship - 1-16 cr.**

A capstone experience integrating knowledge and skills gained through other programming and systems development courses. Involves significant participation in software development projects in a real or simulated business setting. The experience must be equivalent to 150 hours of work experience for each block of 4 credits.

**Prerequisite Courses:** consent of department internship coordinator.

**CIS 4777 - Topics - 0-8 cr.**

Addresses a special need, interest or opportunity and are not a part of the regular curriculum.

**CIS 4999 - Independent Study - 0-4 cr.**

Selected area of interest on which to concentrate.

**Prerequisite Courses:** consent of instructor.

**CIS 6105 - Data Analytics for Decision Making - 3 cr.**

Examination of the use of data to achieve new insights and improved decision making. In this course, students study, transform, and analyze data using modern technologies and methods. Topics include structuring business processes and rules, planning data projects, preparing data for analysis, applying statistical methods, and evaluating the results in the context of decision making.

**CIS 6107 - Data Storage and Retrieval - 3 cr.**

An in-depth study of data storage supporting data analytics and the methods used to extract and combine data from multiple data sources. Topics include relational database design, SQL, data warehouses, non-SQL databases, parallel processing, and the cloud service environment.

**Prerequisite Courses:** CIS 6105

**CIS 6110 - Applications of Data Analytics - 3 cr.**

An in-depth examination of the use of data to achieve new insights and improve decision making. In this course, students apply analytics methods and modern technologies to generate new knowledge from data and effectively communicate the results to a broad audience. Topics include analysis design, data analysis methods and technologies, statistical concepts, and communication of results.

**Prerequisite Courses:** CIS 6105 and CIS 6107

**CIS 6113 - Legal and Ethical Considerations of Information Technologies - 3 cr.**

An examination of information technology's influence on ethical, legal, and social issues. In this course, students investigate current adoptions of information technology and the management strategies of these systems, apply a decision-making model to evaluate these systems, and develop solutions to better serve, protect, and benefit our society.

**CIS 6115 - Applications in Machine Learning - 3 cr.**

Exploration of machine learning algorithms applied to data analysis. Students apply a wide range of classification and regression methods across several problem domains. Students will implement machine learning algorithms to analyze both categorical and temporal data.

**Prerequisite Courses:** CIS 6110

**CIS 6117 - Applied Text Analytics - 3 cr.**

Application of analytics on a corpus of unstructured text data for the purpose of generating new insight and action-oriented decision making. In this course, students define business problems, select text sources, and analyze documents using modern technologies and methods. Topics include text mining, data extraction, sentiment analysis, and other modern text analytics methods.

**Prerequisite Courses:** CIS 6110

**CIS 6118 - Big Data Management - 3 cr.**

Application of large-scale data sets to create new insight and improved decision making. In this course, students differentiate large-scale data management approaches from traditional methods and leverage modern tools to conduct analysis on high volume data. Topics include data architecture, large-scale data preparation and analysis, and integration of qualitative and quantitative data for analysis.

**Prerequisite Courses:** CIS 6110

**CIS 6203 - Enterprise Data Strategies - 3 cr.**

An organization-wide perspective of data and its use in supporting organizational goals and strategies. In this course, students align data strategies with organizational strategies, assess an organization's ability to leverage data, design a data governance structure, and leverage organizational data to answer enterprise-level questions. Topics include strategic alignment, data strategies, data valuation, and data governance.

**Prerequisite Courses:** CIS 6110

**CIS 6204 - Data Visualization and Storytelling - 3 cr.**

An in-depth examination of the use of data, visualizations, and storytelling to generate new insights and improved decision making. In this course, students apply analytics methods and modern technologies to generate new knowledge from data and effectively communicate the results to a broad audience. Topics include visualization best practices, design fundamentals, presenting data stories, and data culture.

**Prerequisite Courses:** CIS 6110

**CIS 6208 - IT Project Management - 3 cr.**

A discussion of the project management process through the framework prescribed by a project management certifying body. Providing an IT perspective of planning, estimating, leading, and monitoring projects. In addition, students will explore the influence that strategic planning and change management can have on IT projects.

**CIS 6209 - Adopting a Data Analytics Practice - 3 cr.**

A practical examination of adopting data analytics methods to change how new insight is developed and decisions are made. In this course, students evaluate an organization's operations to integrate data analytics into current processes, turn data into insight, and gain support for data-based decision making. Topics include process and data evaluation, gap analysis, data analytics pilot programs, and organizational change management.

**Prerequisite Courses:** CIS 6110

**CIS 6700 - Experimental Design Data Analytics - 3 cr.**

Application of research design to data analytics projects. In this course, students evaluate data sources and analytics methods to design valid and reproducible data analysis studies that fully address defined business problems and research questions.

**Prerequisite Courses:** CIS 6105 and CIS 6107 and CIS 6110 and CIS 6113

**CIS 6777 - Independent Study - 3 cr.**

A special offering presented by the CIS graduate program to present emerging developments in the field.

**Prerequisite Courses:** consent of instructor.

**CIS 6780 - Data Analytics Project I - 2 cr.**

Working with a project advisor, students begin a data analytics capstone project. The analytics project synthesizes knowledge of material from across the program curriculum to leverage data analytics as a means of gaining new insight and solving business problems. In this course, students define a business problem and research questions, develop a conceptual model, synthesize knowledge in a literature review, and construct a research design.

**Prerequisite Courses:** CIS 6700

**CIS 6790 - Data Analytics Project II - 2 cr.**

Working with a project advisor, students complete a data analytics project and present the findings to student colleagues and faculty. The completed project is also expressed as a formal written manuscript and submitted for approval and publication. In this course, students define and execute a research methodology, evaluate and apply the research findings, translate the results into actionable recommendations, and communicate the research and recommendations.

**Prerequisite Courses:** CIS 6780

**CIS 6910 - Continued Enrollment: Final Applied Project - 0 cr.**

Continuing Enrollment of the Final Applied Project. This is a zero-credit course billed at one credit.

**CIS 6999 - Independent Study - 0-4 cr.**

Independent research and reading in an area of special interest. Students initiate study in form of a written proposal and complete it under faculty supervision.

**Prerequisite Courses:** consent of supervising faculty and department chair. (8 or 16 weeks)