



## COMPUTER SYSTEMS ANALYSIS MAJOR

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A major in Computer Systems Analysis prepares students to apply programming and systems analysis principles to the selection, implementation, and troubleshooting of customized computer and software installations across the systems development life cycle. It includes instruction in computer hardware and software; the compilation, composition, execution, and operation of information systems; low- and high-level programming languages; programming and debugging techniques; installation and maintenance testing and documentation; process, data flow, and user needs analyses and documentation; cost-benefit analyses; and specification design. Focus is on the entire systems development life cycle including requirements gathering, feasibility analyses, project estimation, system design, quality assurance, implementation, integration, security, documentation, and testing. Established quantitative metrics will be used for identifying project objectives and ensuring quality throughout the systems development life cycle. Students will learn to apply project management principles to a variety of computer-based information systems projects.

The course offerings in Computer Systems Analysis serve majors as well as students majoring in other fields. The lower-level courses present an introduction to information systems concepts and to structured programming. The advanced courses are designed for extended study and include exploration of the theoretical and technical aspects of Computer Systems Analysis. All courses are taught in a computer laboratory setting, permitting experimentation with the practical application of theoretical concepts. Students also present their work in written, electronic, and verbal formats. In addition to the technical focus, students in the major are provided opportunities to practice techniques to develop professional skills related to becoming successful leaders in a wide variety of organizations. Student learning is achieved by applying a problem-based approach focusing on critical thinking, technological understanding, and interpersonal communications.

This major will serve students who are interested in computer systems analysis, software development, computer programming, and/or information systems development. It will also serve students who are more interested in the other aspects of systems development including requirements gathering, design, system testing, project management, and quality control.

The Computer Systems Analysis major will prepare students for either immediate employment or graduate study. Graduates with this major typically pursue a career as a systems analyst, business systems analyst, requirements engineer, software developer, programmer, quality assurance engineer, or project manager in a wide variety of business, non-profit, and industry organizations. Students will also be prepared to enter a wide range of graduate programs in related computing disciplines. It is recommended that students planning graduate study in a computing discipline consider taking additional courses in mathematics. Majors must earn a grade of C- or better in all courses for the major.

You can find the course descriptions for all courses required for this major by clicking on the following links:

- [Computer Systems Analysis Course Descriptions](#)
- [Computing and Digital Technology Course Descriptions](#)
- [Cybersecurity Course Descriptions](#)
- [Digital Media Course Descriptions](#)

## ACADEMIC REQUIREMENTS SUMMARY SHEET

ACADEMIC YEAR 2022-2023

Major: **COMPUTER SYSTEMS ANALYSIS MAJOR**

Student's Last Name

First Name

Middle Initial

Advisor

Date Major Declared

Course #	Title of Course	Hours Required	Semester Completed	Grade
<b>Required Courses:</b>				
CBR 220	Information Security	3		
CDT 101	Computing Across the Disciplines	1		
CSA 104	Programming Logic and Design	3		
CSA 250	IT Infrastructure	3		
CSA 304	Structured Programming	4		
CSA 321	Python Programming	3		
CSA 327	Database Systems	3		
CSA 351	Project Management	3		
CSA 390	Object-Oriented Programming	3		
CSA 404	Data Structures	4		
CSA 470	Computer Systems Analysis Capstone I	3		
CSA 480	Computer Systems Analysis Capstone II	3		
DIG 200	Media Design and Human Behavior	3		
DIG 250	Web Page Design	3		
	<b>Total Hours Required for the Major</b>	<b>42 hours</b>		

If any substitutions or waivers of requirements are allowed, please list below and initial.

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## CSA – Computer Systems Analysis

**CSA 104 Programming Logic and Design** (3 hrs.) This course is an introduction to computer programming logic and design concepts that present the appropriate techniques and tools employed to clearly define and specify the functional requirements of a structured computer program. It promotes sound computer program design through a modular approach emphasizing logical reasoning and critical thinking that will enhance the design of any computer program. Students will test programming logic using a flowchart visualization tool and will explore coding examples from several different low- and high-level programming languages. This course also presents an introduction to the discipline of Systems Analysis and uses the systems development life cycle as a framework in which to introduce topics such as defining user requirements, documentation, software development methodologies, continuous quality management, and system testing strategies. Students will use general purpose software for creating program design documentation and will explore career opportunities in the discipline. It serves as a prerequisite to other programming courses offered through the department. (Previously offered as SEG 104).

**CSA 250 IT Infrastructure** (3 hrs.) The content of this course will present aspects of an organization's IT infrastructure, specifically networking, firewalls, servers, storage options, desktop computing, and mobile devices. Emphasis will be on advantages and disadvantages of different infrastructures and computing and storage options. Cloud computing technologies will be explored as viable options for storage, software, and computing needs of an organization. Information security considerations are included as essential component to any infrastructure decision. Prerequisites: none. Offered every fall.

**CSA 304 Structured Programming** (4 hrs.) This course provides students with experience in properly designing, implementing, and testing structured computer programs implemented in the C++ language using skills developed in CSA 104. The course extends the practice of problem solving, algorithm development, and program documentation forming the foundation for exploring C++ concepts in logic control structures, modular programming, functions, input, output, file processing, user defined data types, static arrays, and user defined function libraries. Programming concepts of code reuse, program interactivity, testing methods, data validation, and user interface design are incorporated throughout the course. Additional topics include proper programming techniques, strategies for debugging, interpreting design documents, and preparing documentation. Prerequisite: CSA 104. Offered every fall semester. (Previously offered as SEG 304).

**CSA 321 Python Programming** (3 hrs.) This course focuses on the essential elements of computer programming design and implementation for constructing applications using the Python programming language. Topics covered include expressions, variables, user-defined functions, logic structures, modules, and file processing. An introduction to Python libraries will include the built-in functions specifically for math, data science, graphics, and user interface applications. Additional topics include proper programming techniques, strategies for debugging, interpreting design documents, and preparing documentation. Interactive, hands-on assignments will provide the student opportunity to design software solutions to authentic problems encountered in a variety of disciplines and careers. Prerequisites: CSC 104. Offered every spring semester. (Previously offered as SEG 321)

**CSA 322 Information Visualization** (3 hr.) Using Excel and Python, students will explore different techniques for representing information for reporting via various media outlets. Additionally, specific Python libraries designed for working with a variety of input file types, file processing, data cleaning, and information visualization will be utilized. Students will have the opportunity to work with data files from a variety of academic disciplines. The ethical collection and use of organizational data will be discussed. This course includes a study of the transformation of organizational data into meaningful information. Students will learn how to use Python and Excel to effectively present information to a variety of audiences in a variety of formats to satisfy a research question or information need. Prerequisites: SEG 104 and SEG 321; or BUS 210. Offered every odd fall semester. (Previously offered as SEG 322)

**CSA 327 Database Systems** (3 hr.) This course will enable the student to translate the information needs of an organization into effective conceptual and logical data models that can be implemented in any relational database system. It utilizes a problem-based approach to learning focusing on teamwork, real-world examples, and in-class exercises allowing the student to immediately apply the knowledge gained. Students will have opportunities to create and manipulate a database from data design documents. Additional topics include dataflow diagrams, database administration, the three-tiered database architecture, data normalization, database transaction management, data security, information assurance, and SQL programming. Prerequisites: CSA 104. Offered every even fall semester. (Previously offered as SEG 327).

**CSA 351 IT Project Management** (3 hr.) This course presents tools and techniques for managing IT systems development projects throughout the systems development life cycle. Topics managing project integration, scope, requirements, schedule, cost, staffing, quality, communications, risk, and procurement. Emphasis is also given to stakeholder management, leading the project team, and project documentation. Students will learn to utilize software tools such as Microsoft Project and Excel to facilitate project management tasks such as cost-benefit analyses, quality metrics, and communications. While the emphasis of this course is on IT systems project management, the concepts are easily transferrable to the management of any type of project. Prerequisites: BUS 220, CSA 104, or ITY 250. (Previously offered as SEG 351)

**CSA 390 Object Oriented Programming** (3 hrs.) This course focuses on the object-oriented programming methodology using the C++ programming language. This methodology is often used for developing large, complex information systems. Topics covered include data abstraction, inheritance, and reusable components. The use of classes and objects is incorporated throughout the object-oriented software development processes of scenario definition, design, building, implementation, and coding. Programming concepts enforced throughout the course specifically emphasize software reliability, testing, and reusability. Additional topics include proper programming techniques, strategies for debugging, interpreting design documents, and preparing documentation. Prerequisites: CSA 104 and CSA 304.

**CSA 404 Data Structures** (4 hrs.) A second course in computer programming in C++ that covers multi-dimensional arrays, dynamic arrays, pointers, user defined data structures, function and operator overloading, records and structs, exception handling, memory management, and various sorting algorithms. This course focuses initially on the basic common data structures (lists, stacks, queues, trees, heaps, graphs) using modular design. Classes and data abstraction are introduced. Careful attention is given to modular architecture that promotes reliability and reusability. Additional topics include proper programming techniques, strategies for debugging, interpreting design documents, and preparing documentation. Prerequisites: CSA 104 and CSA 304. Offered even spring semester. (Previously offered as SEG 404)

**CSA 470 Computer Systems Analysis Capstone I** (3 hrs.) This capstone course is to be taken in the fall semester of the senior year as the first course in a two-course capstone sequence. It would cover the first phases of the systems development life cycle including project estimation and planning, feasibility analysis, cost-benefit analysis, problem analysis, requirements elicitation and definition, solution and engineering design, and quality control planning. The student will engage in a systems development project approved by the instructor to be used to demonstrate concepts presented in the course. The student should select a software development project sufficient in scope to continue through the second capstone course. The project may incorporate programming, web development, media creation, or other type of software as part of the overall project. Additional topics include professional development, career exploration, communications, and technical writing. Prerequisites: CSA 104, CSA 304, or ITY 250, and CSA 351. Offered every fall semester. (Previously offered as SEG 470)

**CSA 480 Computer Systems Analysis Capstone II** (3 hrs.) This capstone course would be taken the spring semester of the senior year as the second course in the two-course capstone sequence. It would cover the final phases of systems development including building, testing, implementation, quality control, and measures of success. The student will engage in a systems development project approved by the instructor and continued from the first capstone course. The project may incorporate programming, web development, media creation, or other type of software as part of the overall system. At the end of this course, the student will have a working prototype of some component of their project, depending on scope and project goals. Heavy emphasis will be placed on quantitative metrics use for cost-benefit analyses, resource management, and quality control. Additional topics include professional development, career readiness, communications, and technical writing. CSA 104, CSA 304, or ITY 250, and CSA 351, CSA 470.

## CDT – Computer and Digital Technology

**CDT 101 Computing Across Disciplines** (1 hr.) In this course, students will explore how computing impacts society across all different disciplines including the Sciences, Humanities, and Social Sciences. Students will conduct research to identify how technology is used within their own major or academic area of interest, think about their own personal and career goals, and develop a plan for enhancing their own computing skills. Prerequisites: none. Offered every spring.

**CDT 454 Computing Practicum** (1 hr.). Members of the Computing Practicum Class work with department faculty to maintain departmental computer labs, prepare and test lab activities and assignments, serve as peer tutors for students enrolled in classes offered through the CDT department, and other types of related activities. (Students desiring to learn more about tutoring and to develop tutoring skills are encouraged to also enroll in LST 180 College Tutoring I.) This is a one credit hour course similar to an internship or mentoring course and will require an estimated 3 hours per week time commitment including 1 hour per week class meeting. It is an opportunity for students to develop skills related to conducting training activities, maintaining computer labs, and to develop specific career skills in which the student is interested . . . skills which will strengthen their resume. Emphasis is placed on career readiness skills. Course may be repeated for credit. Prerequisites: Declared major or minor in Computer Systems Analysis, Digital Media, Cybersecurity, or related self-designed program; AND junior or senior status; AND permission of instructor. Offered every semester.

## CBR – Cybersecurity

**CBR 110 Introduction to Cybersecurity** (3 hrs.) This course will introduce the field of cybersecurity and explore cybersecurity issues from national, international, transnational, institutional, and personal perspectives. We will utilize critical thinking to examine issues facing individuals and society, regardless of culture, such as terrorism, identity theft, and how individuals can be effective and safe users of technology. Readings and discussions from current literature will be included. Prerequisites: None. Offered every fall.

**CBR 220 Information Security** (3 hrs.) This course will introduce practices and policies for deterring, detecting, and responding to cyber attacks on an organization. Topics include computer forensics, software security, information assurance, intrusion detection, network security, cloud computing, business continuity, identity theft, and threat identification. Risks and vulnerabilities will be explored in the areas of computing hardware and devices, users, digital network and communications, and data. Prerequisites: None. Offered every spring.

**CBR 331 Information Storage Management** (3 hrs.) This course provides a comprehensive introduction to storage technology which will enable the student majoring in any discipline to make more informed information storage decisions in the increasingly complex environment of a modern storage infrastructure within any organization. All organizations and academic disciplines are increasingly dependent on data and information residing on some form of network-based storage and dependent on its security, reliability, performance, and availability 24/7. The course focus is on storage architectures, features, and benefits of Intelligent Storage Systems including networked storage technologies; long-term archiving solutions; and the increasingly critical areas of information security, the emerging field of storage virtualization technologies, and information availability and business continuity. This course is appropriate for students from any discipline who desire to know more about managing the risks and features of information storage. Prerequisite: CBR 210 Cybersecurity for Society. Offered in the spring of every odd year.

**CBR 332 Digital Network Security** (3 hrs.) This course provides an overview of the area of digital computer networks and communication, including concepts and designs. Topics to be covered include networking models, and how data signals are transmitted and received. It explores the tradeoff between risk and access, and presents the security vulnerabilities that occur within a networked environment. Network security and defenses at the hardware, software, and policy levels will be identified. Hands-on lab activities will be used to reinforce the topics covered in the course. Prerequisites: CBR 210 Cybersecurity for Society OR CBR 220 Information Security. Offered in the fall of every even year.

**CBR 340 Digital Forensics** (3 hrs.) This course focuses on the tools and processes used by cybersecurity professionals to monitor, detect, and respond to cyber threats to an organization and other various types of computer crimes. Emphasis is placed on the acquisition and preservation of digital artifacts and evidence, data recovery, and information assurance. Hands-on lab activities will provide the students with opportunity to employ some of the current tools used for these purposes. Prerequisite: CBR 220 Information Security. Offered every spring semester.

**CBR 360 Cyber Law and Ethics** (3 hrs.) Students in this class will explore legal and ethical issues related to the Internet, digital data, and the use of digital assets and how these constantly emerging issues effect society. Some of the topics explored in this class includes individual privacy, intellectual property, cyberbullying, censorship, fake news, discipline-specific compliance and regulations, and other current legal and ethical issues. Since the Internet and digital communication can easily cross the globe, an organization's digital assets may be controlled by the laws and ethics of another country. Students will learn how to develop appropriate information security policies and responses based on both legal and ethical considerations. Prerequisites: CBR 110 or CBR 220. Offered every spring.

**CBR 415 Information Security Policy** (3 hrs.) In our data driven, decision-oriented world in which we live, information is a critical and valuable asset of an organization. From real time data mining to global availability, the information of any organization today must be immediate, constant, and reliable. This course will use risk assessments of threats to business continuity/information availability (BC/IA) to plan for BC/IA needs, and describe the critical role that all members of an organization play in the IT BC/IA analysis and planning process. Topics will include data backup, replication, and archival; information security; cloud computing; and disaster recovery. As a final project, students will either develop a BC/IA plan for an actual organization or research a course topic in more depth. While this course is presented from a cybersecurity perspective, it is appropriate for students from any discipline who desire to know more about the dependencies between information, organization, and technology. Prerequisites: CBR 210 Cybersecurity for Society OR CBR 220 Information Security. Offered every spring semester.

**CBR 470 Cybersecurity Capstone** (1 hr.) This course provides students the opportunity to consolidate the coursework in the study of cybersecurity minor into a single capstone experience, although a minor in CBR is not a prerequisite. Working with the CBR minor advisor, students will select an appropriate project based on their interests and career goals within the field of cybersecurity. They may choose to emphasize a specific aspect of Cybersecurity, such as technical implementation, data analysis and decision-making, organizational policies, or national and international political implications. These research project will require the student to identify a topic, formulate a research plan, develop a project plan and timeline, conduct research, and prepare a culminating work. This work may include a research paper, policy recommendation, information assurance and business continuity plan for an organization, data analysis project, or procedures for monitoring and detecting and organization's digital assets. Prerequisites: CBR 110 or CBR 220; AND a non-CBR course related to cybersecurity pre-approved by the CBR Minor advisor. Offered as an independent course as needed.

## DIG – Digital Media

**DIG 250 Web Page Design** (3 hrs.) This course focuses on enabling students to compose and present a variety of digital content using web page technologies and subsequently entire web sites that are easily used by others to effectively find and navigate the information presented. Emphasis will be on the study of interface design concepts including content organization, use of color, typography, multimedia, and accessibility. Students will use general purpose software for creating design documentation and will explore career opportunities in the discipline. It serves as an introductory course to the Digital Media major and is a prerequisite to upper-level Digital Media courses. Prerequisites: None. (Previously offered as ITY 250).