

# COMPUTER SCIENCE (COMP)

## **COMP 101 FUNDAMENTALS OF INFORMATION SYSTEMS TEC (3 credits)**

Broad overview of computer science. Topics include basic concepts in hardware, operating systems and networks, algorithmic problem solving, introduction to the object-oriented paradigm, and an overview of the social context of computing. No background in computer science is assumed or expected. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

## **COMP 120 MICROCOMPUTER APPLICATIONS (3 credits)**

Introduction to useful problem solving, using current software on PC-compatibles and Apple Macintoshes. Major operating systems, word processing, file creation, database management, data communications, electronic spreadsheets, form letters, idea processing, business graphics, sorting, searching, printing, and integrated software systems. Not for credit toward Computer Science major or minor. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees: \$50.00*

## **COMP 121 INTRODUCTION TO WEB DESIGN (4 credits)**

Introduces web page creation using markup and interactive webpage languages utilizing industry standard frameworks. Introduces web server management. Discussion of history and development of the Internet and Web. Includes project-based laboratory work.

*Total Course fees: \$30.00*

*Typically offered: Fall Semester*

## **COMP 131 COMPUTERS IN MODERN SOCIETY (4 credits)**

Impact of computers on present and future society. Benefits and problems of computer technology. History of computing and computers. Ethical and legal basis for privacy protection; technological strategies for privacy protection; freedom of expression in cyberspace; international and intercultural implications. Information security and crime. Social, ethical, political and technological implications and effects of computers in the modern world.

*Total Course fees: \$30.00*

*Typically offered: Spring Semester*

*(INDIVID/SYSTEMS/SOCIETIES)*

## **COMP 152 PROGRAMMING & OBJECT STRUCTURES (4 credits)**

Concepts of object-oriented and procedural software engineering methodologies in data definition and measurement, abstract data type construction and use in developing screen editors, reports and other IS applications. Programming in visual development environment that incorporates event driven and object-oriented design. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees: \$30.00*

*Prerequisites: COMP 101 must be completed or taken concurrently.*

## **COMP 153 HUMAN COMPUTER INTERACTION (3 credits)**

Principles and methods involved in building effective user interfaces. Examination of human factors associated with information systems. User-centered methodologies in the design, development, evaluation, and deployment of IT applications and systems. Focus will be on methods and tools for developing effective user interfaces, evaluation methods such as the conduct of usability and heuristic evaluations, design of appropriate interface elements including the design of menus and other interaction styles. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites: COMP 152.*

## **COMP 160 BEG. PROGRAMMING AND PROBLEM-SOLVING (4 credits)**

Introduces algorithmic problem-solving techniques and the implementation of solutions in the Python programming language. This course assumes no previous programming experience and is appropriate for all students who want to write programs. It is typically the first course taken by students interested in majoring in Computer Science. Includes project-based laboratory work.

*Total Course fees: \$30.00*

*Prerequisites: COMP 160L required co-requisite.*

*Typically offered: Fall Semester, Annually*

*(QUANTITATIVE REASONING)*

## **COMP 161 BEGINNING PROGRAMMING: OBJECTS (4 credits)**

Extends the introduction of programming begun in COMP 160 to include object-oriented programming and basic data structures—linked lists, stacks and queues—and related algorithms. Lectures and mandatory one hour lab session per week.

*Total Course fees: \$30.00*

*Prerequisites: COMP 160, or instructor consent. COMP 161L required co-requisite.*

*Typically offered: Spring Semester*

*(QUANTITATIVE REASONING)*

## **COMP 250 DATABASE PROGRAM DEVELOPMENT (3 credits)**

Application program development in a database environment using a host language. Data structures, file organizations, models of data storage devices, data administration and data analysis, design and implementation. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites: COMP 152 as a pre- or co-requisite.*

## **COMP 252 SYSTEMS ADMINISTRATION AND NETWORKING CONCEPTS (3 credits)**

Installation, administration and maintenance of various modern operating systems widely-used in academic, industrial and research environments. Communications concepts, network architectures, data communication software and hardware. Local Area Networks and Wide Area Networks, network protocol suites. Internetworking and routing, network management, and distributed information systems. Extensive hands-on experience based on the management of a fully functioning computer network systems. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees: \$30.00*

*Prerequisites: COMP 101 must be completed or may be taken concurrently.*

*Typically offered: Fall Semester*

## **COMP 260 DATABASE MANAGEMENT SYSTEMS (4 credits)**

Information systems design and implementation within a database management system environment. Topics include conceptual, logical, and physical data models and modeling tools; mapping conceptual schema to relational schema, entity and referential integrity, relational algebra and relational calculus. Database query languages [Structured Query Language (SQL)]. Relational database design, transaction processing, and physical database design (storage and file structures). Database implementation, including user interface and reports. Lectures and mandatory one hour lab session per week.

*Total Course fees: \$30.00*

*Typically offered: Fall Semester*

**COMP 262 DATA STRUCTURES AND ALGORITHMS (4 credits)**

Adds data abstraction, intermediate data types and related algorithms to the beginning programming techniques learned in COMP 161. Lectures and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 161. MATH 230 completed or concurrent. COMP 262L required co-requisite.

*Typically offered:* Fall Semester

**COMP 280 CLOUD COMPUTING (4 credits)**

Cloud application challenges and alternatives. Basic architecture: Rest and Serverless APIs, Javascript, RDBS and NoSQL databases. Performance and Cost: Network bandwidth and latency, pagination, scanning versus querying. Security: Cross Origin Resource Sharing (CORS). Design and creation of a real-world cloud application as part of a small group. Lectures and mandatory one-hour lab session per week.

*Total Course fees:* \$30.00

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*Prerequisites:* COMP 161, COMP 260

*Typically offered:* Spring Semester, Alternate Years

**COMP 291 PROJECT MANAGEMENT I: FUNDAMENTALS (3 credits)**

Exploration of the purpose of project management, the tasks of project management, and the core managerial skills required. Study of how to leverage and use available resources to develop a project plan and to make and implement decisions. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

**COMP 301 DIGITAL FORENSICS (3 credits)**

Comprehensive understanding of digital forensics and investigation tools and techniques in acquisition, recovery, documentation, and analysis of information contained within and created with computer systems and computing devices. Digital evidence methods and standards, techniques and standards for preservation of data, application forensics, web forensics, network forensics, mobile device forensics, and information security audit. Labs and projects consist of hands-on exercises that reinforce the subject matter. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Typically offered:* Spring Semester

**COMP 302 SOFTWARE ENGINEERING (3 credits)**

Analysis, design, implementation, and testing of a medium-scale software system as a member of a project team. Significant real-world group projects covering all the phases of software development life cycle using high-level automated analysis and design tools. Experience with other important skills such as fact-finding, communications, and project management. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 250.

*Typically offered:* Fall, Spring, and Summer Terms  
(MAJOR WRITING INTENSIVE)

**COMP 305 SOFTWARE ENGINEERING (4 credits)**

Analysis, design, implementation, and testing of a medium-scale software system as a member of a project team. Significant real-world group projects covering all the phases of software of development life cycle using high-level automated analysis and design tools. Experience with other important skills such as fact-finding, communications, and project management. Lectures and mandatory lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 161. COMP 305L required co-requisite. COMP 260.

*Typically offered:* Spring Semester

**COMP 310 WEB SYSTEMS AND TECHNOLOGIES (3 credits)**

Modern applications software in business environments. Topics include: Enterprise web application development and security, web service, and XML in the enterprise. Hands-on experience using current technology to build business-to-business (B2B) and business-to-computer (B2C) applications. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* COMP 250.

**COMP 330 OPERATING SYSTEMS AND NETWORKING (3 credits)**

Operating systems design and implementation. Topics include overview of components of an operating system, mutual exclusion and synchronization, implementation of processes, scheduling algorithms, memory management, and file systems. Net-centric computing, network architectures; issues associated with distributed computing. Lectures and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 161.

*Typically offered:* Spring Semester, Odd Years

**COMP 370 ADVANCED TOPICS IN ALG, COMPLEX, INTELL (4 credits)**

Topics may include: distributed algorithms, complexity classes P and NP, automata theory, algorithmic analysis, cryptographic, geometric or parallel algorithms, compression and decompression, search and constraint satisfaction, knowledge representation and reasoning, agents, natural language processing, machine learning and neural networks, artificial intelligence planning systems and robotics. Lectures and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 160. COMP 370L required co-requisite.

*Typically offered:* Fall Semester

**COMP 375 MOBILE DEVELOPMENT (3 credits)**

Fundamental principles and techniques of interactive application design as they are implemented on an industry standard platform. Topics: emerging technologies, mobile & web programming frameworks, data-driven applications, modern GUI tools, input/output modalities, rapid prototyping, and user experience. Extensive hands-on programming experience via platform-specific APIs. Lecture/discussion.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 161.

*Typically offered:* Spring Semester, Odd Years

**COMP 377 COMPUTER ARCHITECTURE (4 credits)**

Concepts of the fundamental logical organization of a computer (its parts and their relationship) and how it actually works; exposure to a central processor's native language, and to system concepts. Topics in computer hardware, architectures, and digital logic. Lectures and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 160.

*Typically offered:* Spring Semester, Even Years

**COMP 382 MANAGEMENT INFORMATION SYSTEMS (3 credits)**

Real world applications of information systems concepts. The value and uses of information systems for business operation, management decision making, and strategic advantage. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees:* \$30.00

*Prerequisites:* MATH 140 and MATH 160.

**COMP 392 PROJECT MANAGEMENT II: MANAGEMENT SKILLS, ASSESSMENT AND DEVELOPMENT (3 credits)**

Exploration of project management functions and skills, analysis of recurrent problems encountered, and consideration of factors that decision-makers need to understand to be successful. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* COMP 291.

**COMP 393 PROJECT MANAGEMENT III: QUALITY MANAGEMENT FUNDAMENTALS (3 credits)**

Systematic introduction to the art and science of Quality Management that explores the philosophy, theory, principles, concepts, methods, processes, techniques, and tools of Quality Management and TQM, and how to apply them to large and complex projects. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* COMP 392.

*(MAJOR WRITING INTENSIVE)*

**COMP 400 APPLIED SOFTWARE DEVELOPMENT PROJECT (3 credits)**

Comprehensive systems development project. Team approach to analyze, design, and document realistic systems of moderate complexity. Project management methods, scheduling and control, formal presentations, and group dynamics in solving systems problems. Development of a database. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 302 (may be taken concurrently).

**COMP 404 OPERATIONS MANAGEMENT (3 credits)**

Methods for managing production and distribution of manufacturing and service systems. Capacity determination, operating systems design, operating procedures analysis, and control systems development.

OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* MATH 140 and MATH 160.

**COMP 405 PLATFORM-BASED SOFTWARE DEVELOPMENT (3 credits)**

Lectures and mandatory one hour lab session per week. Design and development of software applications that reside on specific platforms. The course focuses on integrated software development environment in which application development methodologies and constraints for web platforms, mobile platforms and game platforms. Lecture and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 260. COMP 405L required as co-requisite.

*Typically offered:* Spring Semester, Even Years

**COMP 430 COMPUTER SECURITY (4 credits)**

Lectures and mandatory one hour lab session per week. Network security concepts and methodologies. Topics include: security concepts and services, physical, operational, and organizational security, the role of people in systems security compliance and operational security; threats and vulnerabilities; network security. Access control and identity management; cryptography. Labs and projects will focus on techniques and tools for vulnerability detection and defense. Lecture and mandatory one hour lab session per week.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 161 or COMP 252 or instructor consent. COMP 430L required concurrently.

*Typically offered:* Fall Semester

**COMP 431 ADVANCED NETWORK COMMUNICATION & SECURITY (4 credits)**

Advanced concepts and applications of network communication and security. Topics include: client-server communications, web services and applications, network systems discovery, advanced access control, trade-off between network usability and security, configuration and hardening recommendations and strategies, monitoring, intrusion detection, countermeasures, and incident response. Emphasis on developing, deploying, and maintaining a secure network communication infrastructure. Lecture and mandatory one hour lab session per week.

Optional weekend field trip event over spring break.

*Total Course fees:* \$30.00

*Prerequisites:* COMP 430 or consent of instructor.

*Typically offered:* Spring Semester

**COMP 450 DATABASE ADMINISTRATION (3 credits)**

Database administration, technology, selection of database management systems. Practicum in data modeling and system development in a database environment. Trends in data management. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* COMP 250.

*(MAJOR WRITING INTENSIVE)*

**COMP 480 INDEPENDENT STUDY (1-3 credits)**

Program of directed tutorial reading on some topic or problem within the discipline relating to the special interests of the student and supervised by a departmental faculty member.

*Total Course fees:* \$30.00

**COMP 484 OPERATIONS RESEARCH (3 credits)**

Quantitative techniques for managerial decision-making. Linear programming, markov analysis, queuing models, network analysis and simulation. OFFERED THROUGH ONLINE AND CONTINUING EDUCATION (OCE) ONLY.

*Prerequisites:* COMP 404.

**COMP 485 ADVANCED TOPICS IN COMPUTER SCIENCE (3 credits)**

Topics of current interest in computer science. May include: advanced software engineering, human computer interaction, advanced networking and systems administration, advanced database systems, computer animation and simulation, finite automata and languages, and intelligent systems. Prerequisites: varies with topic.

*Total Course fees:* \$30.00

*Typically offered:* Spring Semester

**COMP 487 SOFTWARE ENGINEERING INTERNSHIP (1-3 credits)**

Practical on-site work experience in a computer-intensive operation with academic oversight. Experience with a variety of programming languages, operating systems, applications, and machines.

*Prerequisites:* 20 credits in Computer Science.

*(EXPERIENTIAL LEARNING)*

**COMP 490 CAPSTONE PROJECT (4 credits)**

Research or software application development on some topic or problem within the discipline relating to the special interests of the student.

(Listed as COMP 490 and DATA 490)

*Total Course fees:* \$30.00

*Typically offered:* Fall Semester

*(MAJOR WRITING INTENSIVE)*