COP: Computer Programming Courses

Courses

COP 1000  Introduction to Programming
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Introduction to algorithms and basic programming. Topics include variables, control and looping constructs, parameter passing. Emphasizes developing fundamental programming skills and software engineering principles to solve problems in a secure and robust manner.

COP 2253  Programming Using Java
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Introduction to algorithms and object-oriented programming. Topics include control constructs, looping constructs, parameter passing, and arrays. Emphasizes developing fundamental programming skills and software engineering principles in the context of an object-oriented language to solve complex problems in a secure and robust manner.

COP 2334  Programming Using C++
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Introduction to computers and algorithms. Programming in a high level language. Topics include structured programming techniques, procedural and data abstraction. Students will learn the fundamentals of developing coherent, expressive programs.

COP 2830  Script Programming
College of Sci and Engineering, Department of Department of Information Tech
3 sh (may not be repeated for credit)
Introduction to the essential skills of programming with scripting. Topics include use and manipulation of variable, design and validation of forms, and writing scripts for systems calls and command line arguments.

COP 3014  Algorithm and Program Design
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
An introduction to advanced computational and problem solving techniques. Emphasis on the use of basic programming constructs to create correct, efficient algorithms. Secondary focus on the basic structure and decomposition of programs. This course will include several laboratory projects.

COP 3022  Intermediate Computer Programming
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 2253
An intermediate course in object-oriented programming. Topics include object-oriented modeling, algorithms, inheritance, polymorphism, input/output. Emphasis will be on issues of object-oriented design and good programming practices. Students entering this course are expected to have a solid knowledge of programming in the object-oriented paradigm. The focus will be on developing skills in program design as a necessary prerequisite to effective implementation.

COP 3530  Data Structures and Algorithms I
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 3014
A first course in Data Structures and Algorithms. Topics will include traditional data structures with a major focus on design and analysis of algorithms and will include projects that stress mathematics and science.

COP 3665  Mobile Programming
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 3022
Concepts and skills related to programming mobile devices, with specific emphasis on at least one modern mobile programming language or framework.

COP 3813  Server-Side Programming
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 2334 OR COP 2253 OR COP 3014
A course in principles of server-side technologies that form the core of classical three-tier applications. This course provides a solid foundation for the concepts of server-side programming, using a current server-side programming/scripting language.

COP 3905  Directed Study
College of Sci and Engineering, Department of Computer Science
1-12 sh (may be repeated indefinitely for credit)

COP 4020  Programming Languages
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 3530 AND COP 4027
Programming language theory and practice, including language design and implementation, theoretical foundations, language translation, and exposure to a variety of programming paradigms.

COP 4027  Advanced Computer Programming
College of Sci and Engineering, Department of Computer Science
3 sh (may not be repeated for credit)
Prerequisite: COP 3022
Addresses advanced topics in computer programming including advanced tools and IDEs, user interface design and implementation, user validation, network programming, data communication, enterprise programming principles, multi-tier systems, and concurrent programming. Emphasis will be developing skills in program design as necessary prerequisite to effective implementation.
COP 4331  Object Oriented Programming  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 3530  
Exploration of the fundamental ideas behind object-oriented programming, including encapsulation, inheritance, and polymorphism. Applications will focus on extracting objects from a problem domain, designing problem solutions based on message-passing between objects, and documenting object-oriented design. Implementations will be done in a current object-oriented language.

COP 4365C  Advanced Topics in C# Programming  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: (COP 2253 OR COP 2334) AND (COP 4710)  
This course covers advanced concepts and applications of C# programming. Topics covered will include: event-driven programming, user interfaces, inheritance, exception handling and input/output, data structures, threads and animation, networking, interfacing with databases, ASP.NET. Prerequisites: (COP 2253 or COP 2334) and COP 4710 (minimum grade C-).

COP 4534  Data Structures and Algorithms II  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 3530 AND COT 3100*  
A second course in Data Structures and Algorithms. Topics include mathematical properties of algorithms (complexity, correctness), heaps, height-balanced trees, graphs, greedy algorithms, dynamic programming, and proof techniques pertaining to computational complexity. Emphasis on issues of correctness and efficiency. Students entering this course are expected to have a solid knowledge of programming.

COP 4610  Theory and Fundamentals of Operating Systems  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: CDA 3101  
A functional systematic examination of the key components and theories of a modern operating system, including process, thread management, synchronization, I/O, and memory management. Emphasizes using several modern operating systems and writing programming scripts to manipulate these operating systems.

COP 4634  Systems & Networks I  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: (CDA 3101 OR EEL 3701) AND (COP 3530)  
This course reviews fundamental principles of modern operating systems and relates them to computer programming. Students learn about the design of various components of operating systems and the services they provide to end users and application developers. The role of security in operating systems is covered.

COP 4635  Systems & Networks II  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: (STA 4321 OR EGS 3441) AND ((COP 4534* AND COP 4634))  
This course is a continuation of topics discussed in System & Networks I, focusing on fundamental principles of modern computer networks and network programming. The course will study the structure of networks, networking devices, network protocol stacks, congestion and flow control analysis and algorithms, network routing algorithms and protocols, and network traffic analysis. The course also covers client/server and peer-to-peer network programming and the role of security in networks.

COP 4710  Database Systems  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 2334 OR COP 2253 OR COP 2830  
Introduction to database systems and database management system architectures. Various database models are discussed with an emphasis on the relational model and relational database design. Case applications using fourth-generation languages, such as SQL, are included. Offered concurrently with COP 5725; graduate students will be assigned additional work.

COP 4723  Database Administration  
College of Sci and Engineering, Department of Department of Information Tech  
3 sh (may not be repeated for credit)  
Prerequisite: COP 4710  
Database administration skills covering installation, configuration and tuning a database, administering servers and server groups, managing and optimizing schemes, tables, indexes, and views, creating logins, configuring permissions, assigning roles and performing other essential security tasks, backup and recovery strategies, automation and maintenance.

COP 4856  Distributed Software Architecture  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 3022 AND COP 4710  
Software aspects of distributed architecture, with emphasis on database integration and interoperability of distributed components.

COP 4864  Client-Side Programming  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 3813  
A course in principles of client-side technologies that form the complement of server-side applications. This course provides a solid foundation for the concepts of client-side programming and an introduction into client-side frameworks.

COP 4905  Directed Study  
College of Sci and Engineering, Department of Computer Science  
1-12 sh (may be repeated indefinitely for credit)
COP 5007  Foundations: Programming Essentials  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
A course in the Accelerated Software Engineering Foundations  
Series in which students will gain a comprehensive understanding  
of principles/concepts of Java programming and how to apply  
those principles/concepts in conjunction with principles of software  
engineering to design and develop object- oriented software systems.  
Students taking this course should have an understanding of  
programming language fundamentals including variables, constants,  
selection, iteration, arrays, and functions or methods.

COP 5416  Foundations: Data Structure & Algorithms Essentials  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
A comprehensive overview of the most commonly used data structures  
including arrays, linked lists, trees, graphs, hash tables, and heaps.  
a survey of common algorithms including those that are used with  
the data structures as well as sorting, searching, divide-and-conquer,  
greedy algorithms and dynamic programming. Students taking this  
course should have a good understanding of programming language  
fundamentals including variables, constants, selection, iteration,  
arrays, file I/O and functions. This course may require completion  
of graduate foundations courses in computer programming or the  
equivalent undergraduate coursework if a student has insufficient  
a cademic or professional experience in the discipline.

COP 5518  Foundations: Computing Essentials  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
This course reviews fundamental principles of modern computer  
architectures, operating systems and computer networks and relates  
them to computer programming. The course covers topics such as  
the design of various components of operating systems and services  
they provide to users and application developers, network structures  
& devices, network protocol stacks, network performance metrics,  
network routing algorithms, and network traffic analysis. The role of  
security in systems and networks will also be covered. This course  
may require completion of graduate foundations courses in computer  
programming or the equivalent undergraduate coursework if a student  
has insufficient academic or professional experience in the discipline.

COP 5519  Programming for Information Technology  
College of Sci and Engineering, Department of Department of  
Information Tech  
3 sh (may be repeated for up to 3 sh of credit)  
Programming for IT focuses on using scripting languages to interact  
with the terminal and using libraries, dictionaries, user defined  
functions and automation technologies to ensure that IT systems are  
working effectively, efficiently and in a secured environment.

COP 5522  Parallel and Distributed Programming  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
A comprehensive overview of parallel programming using MPI and  
OpenMP. A survey of common parallel architectures, communication  
primitives, applications of those primitives to design of efficient  
parallel algorithms, definition of models and metrics to evaluate the  
effectiveness of parallel algorithms theoretically and empirically, and  
introduction to cloud computing. Students taking this course should  
have a good understanding of undergraduate level data structures and  
 algorithms, and mastery of undergraduate level programming in a Unix  
environment.

COP 5725  Database Systems  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Introduction to database systems and database management  
system architectures. Various database models are discussed with  
emphasis on the relational model and relational database design.  
Case applications using fourth-generation languages, such as SQL  
are included. This course requires completion of graduate foundations  
courses in computer programming or the equivalent undergraduate  
coursework.

COP 5775  Database Administration  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 5725  
Database administration skills covering installation, configuration and  
tuning a database, administering servers and server groups, managing  
and optimizing schemas, tables, indexes, and views, creating logins,  
configuring permissions, assigning roles and performing other  
essential security tasks, backup and recovery strategies, automation  
and maintenance.

COP 5905  Directed Study  
College of Sci and Engineering, Department of Computer Science  
1-12 sh (may be repeated indefinitely for credit)  

COP 6025  Advanced Programming Languages  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Theory and practice of programming language design. Topics  
include: advanced language constructs, an overview of parallel  
programming, formal specification of programming languages, the  
analysis/synthesis model of program translation, code optimization,  
and compiler construction tools. Students will design and implement a  
small programming language. Knowledge of COP4020 or COT4420 is  
necessary for success in this course.

COP 6727  Advanced Database Systems  
College of Sci and Engineering, Department of Computer Science  
3 sh (may not be repeated for credit)  
Prerequisite: COP 5725  
Advanced topics in database management systems will be covered, for  
example, further dependencies and higher normal forms, transaction  
processing, concurrency control, backup and recovery, indexing,  
replication, managing large databases, and contemporary issues and  
topics in databases.
COP 6905 Directed Study
College of Sci and Engineering, Department of Computer Science
1-12 sh (may be repeated indefinitely for credit)
* This course may be taken prior to or during the same term.