
COMPUTER SCIENCE (COMP)

COMP 101 Computer Science I (3 credits)

This is a beginning course in programming, which introduces concepts of computer organization. Problem-solving methods and algorithmic development stressing good programming style and documentation including top down and modular design will be covered. This course emphasizes problem solving with programming exercises run on the computer. *Either semester*

COMP 102 Computer Science II (3 credits)

Prerequisite: COMP 101

This course includes advanced programming techniques. Basic aspects of recursion will be introduced. Core search-and-sort methods, simple data structures, subroutines and parameters, and algorithmic analysis will be covered. Techniques of algorithmic development and programming will be stressed. The emphasis on good programming style and documentation begun in COMP 101 will be continued. *Either semester*

COMP 105 Computers and Their Applications: An Introduction (3 credits)

The goal of this course is to provide a student with no previous computer experience the opportunity to become computer literate. The course consists of equal parts of textbook/lecture learning and hands-on experience with software such as an operating system, a spreadsheet, a word processor, presentation graphics and Internet services including electronic mail. The course is especially recommended for the new PC user but does not fulfill any requirements of the computer science major.

COMP 111 Elementary Visual Programming (3 credits)

This course provides an introduction to computer programming for non-computer science majors who have no previous programming experience. Topics include simple data types, control structure, and introduction to array and string data structure and algorithms, history of computer science, computer systems and environments. The course emphasizes object-oriented design and programming using the Alice programming system. Using Alice, students will write programs that produce 3-D computer animations.

COMP 135-136 Freshman Honors Colloquium (1 credit each semester)

Prerequisite: Open to Commonwealth Honors students and to others at the discretion of the instructor

Freshman Honors Colloquia in computer science allow exceptionally able students to explore a challenging topic in small classes under close faculty supervision. Colloquia meet once a week for 50 minutes and culminate in a paper or scientific project, which provides the major part of the grade. The minimum enrollment is two and the maximum is 12. Topics vary from semester to semester. *COMP 135 fall semester, COMP 136 spring semester*

COMP 199 First Year Seminar (3 credits)

Prerequisite: Open to all freshmen with a writing placement score of 3 or above or a SAT score of 500 or above. Students with 24 or more transfer credits will have this requirement waived.

First Year Seminars (FYS) are writing-intensive, topic courses that introduce students to academic thought, discourse and practices. FYS courses prepare and orient students toward productive and fulfilling college careers by actively engaging them in a specific academic area of interest. Students will improve their writing, reading, research and basic information and technology skills while learning to work both collaboratively and independently. These courses will fulfill the First Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one FYS course may be taken for credit. (CFYS)

COMP 201 Assembly Language Programming (3 credits)

Prerequisite: COMP 102

This is a basic course in machine-level programming. Number systems and data representation; arithmetic and logical instructions, indexing, I/O, subroutines; structure and modularity of programs and data at the machine level; and macro definition and recursion will be included. This course will emphasize programming in assembly language. *Fall semester*

COMP 203 Programming and Computer Algebra (3 credits)

Prerequisite: MATH 151 or MATH 141, which may be taken concurrently

Note: A mathematics or computer science major who has successfully completed COMP 101 may not take this course for credit. In this course, students will solve problems by writing computer programs that include input, output and control structures (sequence, selection, repetition). In addition, the student will learn and use some of the tools of a computer algebra system and do programming in the system.

COMP 206 Introduction to Computer Organization (3 credits)

Prerequisite: COMP 102

In this course, the organization and structure of major hardware components of computers; mechanics of information transfer and control within a digital computer system, and the fundamentals of logic design will be covered. The major emphasis of the course concerns the functions of and communication between the large scale components of a computer system, including properties of I/O devices, controllers and interrupts. *Spring semester*

COMP 210 COBOL I (3 credits)

Prerequisite: Knowledge of at least one programming language

This course includes the elements of structured COBOL programming. Topics will be chosen from the following: arithmetic operation statements, report editing, heading lines, comparisons, complex and nested IF statements, single- and multiple-level control break processing with group indication, one-dimension table processing — subscript, index, table search. *Fall semester*

COMP 220 Topics in Programming Languages (3 credits)

Prerequisite: COMP 102 or equivalent

This course provides an introduction to different programming languages such as Java and Smalltalk. It is intended as a course for students who have previously programmed but want to explore different programming languages. This course may be repeated for credit with different language topics. It does not count as a departmental elective for computer science majors.

COMP 286-287 Sophomore Honors Colloquium (1 credit each semester)

Prerequisite: Open to Commonwealth Honors students and to others at the discretion of the instructor

Sophomore Honors Colloquia in computer science allow exceptionally able students to explore a challenging topic in small classes under close faculty supervision. Colloquia meet once a week for 50 minutes and culminate in a paper or scientific project, which provides the major part of the grade. The minimum enrollment is two and the maximum is 12. Topics vary from semester to semester. *COMP 286 fall semester, COMP 287 spring semester*

COMP 298 Second Year Seminar (Speaking Intensive) (3 credits)

Prerequisite: ____199; Open to all sophomores and juniors who have completed ENGL 101, and the speaking skills requirement. Students with 54 or more transfer credits will have this requirement waived. Cannot be taken if ____299 is taken for credit.

Second Year Seminars (SYS) are speaking-intensive, topic courses that build on the academic skills and habits introduced in the First Year Seminar. SYS courses engage students in a specific academic area of interest and provide them with the opportunity to reinforce, share and interpret knowledge. Students will improve their speaking, reading, research and basic information and technology skills while building the connections between scholarship and action that are required for lifelong learning. These courses will fulfill the Second Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one SYS course may be taken for credit. (CSYS)

COMP 299 Second Year Seminar (Writing Intensive) (3 credits)

Prerequisite: ____199; Open to all sophomores and juniors who have completed ENGL 101 and ENGL 102. Students with 54 or more transfer credits will have this requirement waived. Cannot be taken if ____298 is taken for credit.

Second Year Seminars (SYS) are writing-intensive, topic courses that build on the academic skills and habits introduced in the First Year Seminar. SYS courses engage students in a specific academic area of interest and provide them with the opportunity to reinforce, share and interpret knowledge. Students will improve their writing, reading, research and basic information and technology skills while building the connections between scholarship

and action that are required for lifelong learning. These courses will fulfill the Second Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one SYS course may be taken for credit. (CSYS)

COMP 330 Data Structures and Algorithms (3 credits)

Prerequisite: COMP 102

In this course, static, semistatic and dynamic data structures and techniques for the analysis and design of efficient algorithms which act on data structures will be addressed. Course topics will include arrays, records, stacks, queues, deques, linked lists, trees, graphs, sorting and searching algorithms, algorithms for insertion and deletion and the analysis and comparison of algorithms. *Spring semester*

COMP 338-339 Honors Tutorial (3 credits each semester)

Prerequisite: Open to Commonwealth and Departmental Honors students and consent of the department

Special topics in computer science will be offered. Three hourly meetings weekly. *COMP 338 fall semester, COMP 339 spring semester*

COMP 340 Organization of Programming Languages (3 credits)

Prerequisite: COMP 201 and MATH 130 and COMP 330

This course is an introduction to the structure of programming languages. Formal specification of syntax and semantics; structure of algorithmic, list processing, string manipulation, data description and simulation languages; basic data types, operations, statement types and program structure; and run-time representation of program and data will be included. Particular emphasis will be placed on block-structured languages (ALGOL-68, Pascal, Ada, C) and interpreted languages (APL, LISP, SNOBOL). Programming assignments made in several languages are required. *Spring semester*

COMP 345 Compiler Construction (3 credits)

Prerequisite: COMP 330 and COMP 340

This course includes compiler structure; lexiysis, syntax analysis, grammars, description of programming language, automatically constructed recognizers, and error recovery; semantic analysis, semantic languages, semantic processes, optimization techniques and extendible compilers. Students will write a sample compiler in this course.

COMP 350 Operating Systems (3 credits)

Prerequisite: COMP 206 and COMP 330

Discussion of the organization and structure of operating systems for various modes of computer use from simple batch systems to time-sharing/multiprocessing systems are covered in this course. Topics include concurrent processing, memory management, deadlock, file systems, scheduling, etc. Programming assignments made in a high-level language with concurrent processing feature are required. *Fall semester*

tMay be taken for graduate-level credit

COMP 399 Topics in Theoretical Computer Science (3 credits)

Prerequisite: Varies dependent on topic

Course topics will be selected from: artificial intelligence, automata theory, computational complexity theory, mathematical linguistics, programming language theory and other theoretical computer science topics. This course may be repeated for credit with different topics.

COMP 405 Introduction to Database Systems (3 credits)

Prerequisite: MATH 130 and COMP 330

This course includes physical data organization; the hierarchical, network and relational data models; design theory for relational database, data dependencies, normal forms and preventing loss of information; query optimization; and integrity and security of databases. Students will implement applications on a relational database system.

COMP 410 Database Applications (3 credits)

In this course, the role of a database in an MIS environment is studied. Team analysis and implementation of a database project will be a major course component. This course does not fulfill computer science major requirements.

COMP 427 Internet Programming (3 credits)

Prerequisite: COMP 340

This is an introductory course on Internet programming. Students in this course will learn about the Internet and its fundamental request-response paradigm. Topics to be covered include fundamentals of the Web, client/server architectures, Internet protocols and programming.

COMP 430 Computer Networks (3 credits)

Prerequisite: COMP 330

This course includes an introduction to data transmission, digital multiplexing and data switching, characteristics of transmission media, terminals, modems and communication processes; design of error control, line control, and information flow control procedures; study of message and packet switching networks; protocols and software in packet switching systems; and modeling techniques for networks.

COMP 435 Analysis of Algorithms (3 credits)

Prerequisite: COMP 330

This course is a general overview of algorithms, including algorithmic techniques needed in problem solving, and relative efficiency of algorithms. Topics will include efficient algorithms for data manipulation, graphical analysis, rapid evaluation of algebraic functions and matrix operations, and $N \log N$ bound in sorting algorithms.

COMP 436 Computer Graphics (3 credits)

Prerequisite: COMP 330; and either MATH 120 or MATH 202

This course includes an introduction to hardware, algorithms and software of computer graphics. Topics include line generators, affine transformations, line and polygon clipping, splines,

interactive techniques, menus, orthographic and perspective projections, solid modeling, hidden surface removal, lighting models and shading.

COMP 437 Simulation and Game Design (3 credits)

Prerequisite: COMP 436

This course introduces techniques used to design and implement computer games. Topics include a historic overview of computer games, the preparation of game documents and the use of a game engine, modeling software and terrain generator. A game will be designed and implemented in a team environment.

COMP 442 Object-Oriented Software Engineering (3 credits)

Prerequisite: COMP 330

This is a project course in the development of a large-scale software system using OO methodologies. The primary process involves discovering classes and objects that model both the application domain and the solution space, identifying the semantics of these classes and objects and establishing relationships among them, and implementing the classes and objects using appropriate data structures and algorithms. This primary process is controlled by a well-defined development framework with the following steps: 1) establishing core requirements, 2) providing a model of the system's behavior, 3) creating an architecture for the implementation, 4) evolving the implementation through successive iterations, and 5) maintaining the system.

COMP 445 Logic Programming (3 credits)

Prerequisite: Junior or senior mathematics or computer science major or equivalent background; and consent of the department

This course will introduce the student to the logical programming paradigm using a language such as Prolog or LISP.

COMP/MATH 460 Introduction to Robotics (3 credits)

Prerequisite: COMP 102 and either MATH 152 or MATH 142, and MATH 202 or MATH 120

This course is an introduction to the theory of the motion of robot manipulators. The mathematics, programming and control of manipulators will be emphasized. Issues of sensing and planning will also be examined.

COMP 470 Introduction to Artificial Intelligence (3 credits)

Prerequisite: Restricted to computer science majors and completion of 29 credits of computer science courses in the major

This course introduces students to the basic concepts and techniques of artificial intelligence. Emphasis is given to representation and the associated data structures. Students will also be introduced to an AI language such as LISP.

COMP 485 Honors Thesis (3 credits)

Prerequisite: Open to Commonwealth and Departmental Honors students

One-hour weekly meetings with the thesis director will culminate in an honors thesis. With the consent of the Departmental Honors Committee and the thesis director this course may be extended into a second semester for three additional credits depending

tMay be taken for graduate-level credit

Note: This section is arranged in course number order. See pages 237-238 (course prefix key) for assistance in locating department sections.

Note: See Catalog Web Addenda at www.bridgew.edu/catalog/addenda as that information supersedes the published version of this catalog.

upon the scope of the project. Whether the final version of the thesis qualifies the student to graduate with honors will be determined by the Departmental Honors Committee. *Either semester*

COMP 498 Internship in Computer Science (3 credits)

Prerequisite: A minimum of 24 approved hours in computer science and consent of the department; formal application required
In this course, students will work for an employer in the computer science field for a minimum of 10 hours/week during one full semester. A member of the department will serve as adviser and evaluator of all work projects. This course can be taken only once for credit. Graded on a (P) Pass/(N) No Pass basis.

COMP 499 Directed Study in Computer Science (1-3 credits)

Prerequisite: Consent of the department; formal application required
Directed study is open to juniors and seniors who have demonstrated critical and analytical abilities in their studies and who wish to pursue a project independently. May be taken twice for a maximum of six credits.

COMP 502 Research (credit to be arranged)

Prerequisite: Consent of the department; formal application required
Original research is undertaken by the graduate student in their field. For details, consult the paragraph entitled "Directed or Independent Study" in the "School of Graduate Studies" section of this catalog. This course may be repeated.

COMP 503 Directed Study (credit to be arranged)

Prerequisite: Consent of the department; formal application required
Directed study is designed for the graduate student who desires to study selected topics in a specific field. For details consult the paragraph entitled "Directed or Independent Study" in the "School of Graduate Studies" section of this catalog. This course may be repeated.

COMP 510 Topics in Programming Languages (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
This course investigates programming language development from designer's, user's and implementer's point of view. Topics include formal syntax and semantics, language system, extensible languages and control structures. There is also a survey of intralanguage features, covering ALGOL-60, ALGOL-68, Ada, Pascal, LISP, SNOBOL-4 APL, SIMULA-67, CLU, MODULA, and others.

COMP 520 Operating Systems Principles (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
This course examines design principles such as optimal scheduling; file systems, system integrity and security, as well as the mathematical analysis of selected aspects of operating system design. Topics include queuing theory, disk scheduling, storage management and the working set model. Design and implementation of an operating system nucleus is also studied.

COMP 525 Design and Construction of Compilers (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
In this course, topics will include lexical and syntactic analysis; code generation; error detection and correction; optimization techniques; models of code generators; and incremental and interactive compiling. Students will design and implement a compiler.

COMP 530 Software Engineering (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
Topics in this course will include construction of reliable software, software tools, software testing methodologies, structured design, structured programming, software characteristics and quality and formal proofs of program correctness. Chief programmer teams and structure walk-throughs will be employed.

COMP 536 Graphics (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
This course examines typical graphics systems, both hardware and software. Topics include design of low-level software support for raster and vector displays, three-dimensional surface and solids modeling, hidden line and hidden surface algorithms. Shading, shadowing, reflection, refraction and surface texturing are also included.

COMP 540 Automata, Computability and Formal Languages (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
Topics in this course will include finite automata and regular languages, context-free languages, Turing machines and their variants, partial recursive functions and grammars, Church's thesis, undecidable problems, complexity of algorithms and completeness.

COMP 545 Analysis of Algorithms (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
This course deals with techniques in the analysis of algorithms. Topics to be chosen from among the following: dynamic programming, search and traverse techniques, backtracking, numerical techniques, NP-hard and NP-complete problems, approximation algorithms and other topics in the analysis and design of algorithms.

COMP 560 Artificial Intelligence (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor
This course is an introduction to LISP or another AI programming language. Topics are chosen from pattern recognition, theorem proving, learning, cognitive science and vision. It also presents introduction to the basic techniques of AI such as heuristic search, semantic nets, production systems, frames, planning and other AI topics.

COMP 562 Expert Systems (3 credits)

Prerequisite: COMP 560

Architectures currently used in building expert systems are studied in this course. The main current systems are surveyed along with expert system environments and tools.

COMP 565 Logic Programming (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

This course is an introduction to first order predicate logic as a problem-solving tool. Logic programming languages such as PROLOG are studied along with applications of logic programming to mathematics fields, natural language processing and law.

COMP 570 Robotics (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

This is a project-oriented course in robotics. Topics are chosen from manipulator motion and control, motion planning, legged-motion, vision, touch sensing, grasping, programming languages for robots and automated factory design.

COMP 575 Natural Language Processing (3 credits)

Prerequisite: COMP 560

This is a historical survey of question-answering systems. Topics include analysis and computational representation of syntactic and semantic structures for artificial intelligence application using English; current text systems; simulation of brief systems and other aspects of cognition; use of natural language systems; and generation of text or speech.

COMP 580 Database Systems (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

In this course, topics will include relational, hierarchical and network data models; design theory for relational databases and query optimization; classification of data models, data languages; concurrency, integrity, privacy; modeling and measurement of access strategies; and dedicated processors, information retrieval and real time applications.

COMP 582 Distributed Database Systems (3 credits)

Prerequisite: COMP 580

The problems inherent in distributed databases on a network of computer systems are studied in this course, including file allocation, directory systems, deadlock detection and prevention, synchronization, query optimization and fault tolerance.

COMP 590 Computer Architecture (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

This course is an introduction to the internal structure of digital computers including design of gates, flip-flops, registers and memories to perform operations on numerical and other data represented in binary form; computer system analysis and design; organizational dependence on computations to be performed; and theoretical aspects of parallel and pipeline computation.

COMP 594 Computer Networks (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

This course is an introduction to data transmission, digital multiplexing and data switching. Topics include characteristics of transmission media, terminals, modems and communication processes; design of error control, line control and information flow control procedures; study of message and packet switching networks; protocols and software in packet switching systems; and modeling techniques for networks.

COMP 596 Topics in Computer Science (3 credits)

Prerequisite: Admission to the MS program in Computer Science or consent of instructor

In this course, topics are chosen from program verification, formal semantics, formal language theory, concurrent programming, complexity or algorithms, programming language theory, graphics and other computer science topics. This course may be repeated for credit with different topics.

COMP 599 Computer Science Seminar (3 credits)

Prerequisite: Minimum of 12 credits in 500-level science course work
This is a project-oriented seminar in computer science. Projects will be individually assigned.

Other Approved Courses

COMP 100 Programming in BASIC
COMP 211 COBOL II
COMP 395 Computer Science Seminar
COMP 550 Topics in Discrete Mathematics