COMPUTER SCIENCE (COMF, COMP)

COMF 510 Computer Software Foundations (3 credits)

Designed to prepare students who have an undergraduate degree in a field other than computer science to enter the MS in Computer Science program. Covers essential aspects of computer software development. Software development methodology, problem solving and structured programming in a high-level language. Program style and documentation. Fundamental data structures, searching, and sorting algorithms.

COMF 520 Computer Systems Foundations (3 credits)

Prerequisite: Working knowledge of C or C++

Designed to prepare students who have an undergraduate degree in a field other than computer science to enter the M.S. in Computer Science program. This course is an introduction to computer systems, their organization and low-level interface. It covers number systems, Von Neumann machines, instruction sets and machine code, data representation, assemblers and assembly language programming, compilers and system software, external and internal processor organization, memory, I/O organization and devices. It goes into a detailed study of RISC processor architecture.

COMF 530 Computer Theory Foundations (3 credits)

Designed to prepare students who have an undergraduate degree in a field other than computer science to enter the M.S. in Computer Science program. An introduction to the theory of computer science for students entering the master's program without an undergraduate degree in computer science. Beginning with a survey of discrete mathematics (primarily combinatories and graph theory), this course will introduce topics in the theory of computation as well as in algorithms and complexity theory.

COMP 100 Programming in BASIC (3 credits)

Problem solving. Principles of computer programming taught with the aid of the BASIC language. Topics to include the LET, INPUT, READ, IF and FOR statements; arrays; numerical and string functions; other topics as time allows.

COMP 101 Computer Science I (3 credits)

A first course in programming. Introductory concepts of computer organization. Problem solving methods and algorithmic development stressing good programming style and documentation including top down and modular design. This course emphasizes problem solving with programming exercises run on the computer. *Either semester*

COMP 102 Computer Science II (3 credits)

Prerequisite: COMP 101

Advanced programming techniques. Introduction to basic aspects of recursion. In core search and sort methods, simple data structures, subroutines and parameters and algorithmic analysis. 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 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 201 Assembly Language Programming (3 credits)

Prerequisite: COMP 102

A basic course in machine-level programming. Number systems and data representation; arithmetic and logical instructions, indexing, I/0, subroutines; structure and modularity of programs and data at the machine level. Macro definition, recursion. This course will emphasize programming in assembly language. *Fall semester*

COMP 206 Introduction to Computer Organization (3 credits)

Prerequisite: COMP 201

Organization and structure of the major hardware components of computers. Mechanics of information transfer and control within a digital computer system. Fundamentals of logic design. 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/0 devices, controllers, and interrupts. *Spring semester*

Note: *This section is arranged in course number order. See course prefix key for assistance in locating department sections.*

COMP 210 COBOL I (3 credits)
Prerequisite: Knowledge of at least one programming language
The elements of structured COBOL programming. Topics 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 211 COBOL II (3 credits)
Prerequisite: COMP 210
Continuation of topics of structured COBOL programming. Topics from the following: multi-level tables, subprograms, input editing, report writer facility, the sort facility, sequential files, indexed sequential files, and relative files. Creation and file update for sequential and indexed sequential files. *Spring 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 fifty 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 twelve. Topics vary from semester to semester. *COMP 286 Fall semester, COMP 287 Spring semester*

COMP 330 Data Structures and Algorithms (3 credits)
Prerequisite: COMP 102
Static, semistatic, and dynamic data structures. Techniques for the analysis and design of efficient algorithms which act on data structures. 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. Three hourly meetings weekly. *COMP 338 Fall semester, COMP 339 Spring semester*

COMP 340 Organization of Programming Languages (3 credits)
Prerequisite: COMP 201, MATH 130, COMP 330
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; run-time representation of program and data. Particular emphasis placed on block-structured languages (ALGOL-68, Pascal, Ada, C) and interpreted languages (APL, LISP, SNOBOL). Programming assignments made in several languages. *Spring semester*

COMP 345 Compiler Construction (3 credits)
Prerequisite: COMP 330, COMP 340
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.

COMP 350 Operating Systems (3 credits)
Prerequisite: COMP 206, 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. Topics include concurrent processing, memory management, deadlock, file systems, scheduling, etc. Programming assignments made in a high-level language with concurrent processing feature. *Fall semester*

COMP 395 Computer Science Seminar (3 credits)
Prerequisite: A minimum of 24 approved hours in computer science and consent of the department
Interdisciplinary uses of computers. Problems arising through the increasing use of computers in our society. Seminar will be project oriented and students will present their work to the class for discussion and criticism.

COMP 399 Topics in Theoretical Computer Science (3 credits)
Prerequisite: Consent of the instructor
Topics to 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.

Note: *This section is arranged in course number order. See 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.*

COMP 405 Introduction to Database Systems (3 credits†)

Prerequisite: MATH 130, COMP 330

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. Integrity and security of data bases. Students implement applications on a relational data base system.

COMP 410 Database Applications (3 credits†)

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 425 Social and Professional Issues in Computing (1 credit)

Prerequisite: COMP 330; restricted to senior status in computer science

This course introduces the social, ethical, and legal implications of living and working in an information technology society. Discussions will focus on responsibility, liability, and accountability to allow students to view ethical decision making as a critical part of understanding the computing world.

COMP 427 Internet Programming (3 credits)

Prerequisite: COMP 340

This is an introductory course on Internet programming. Students in the 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

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

General overview of algorithms. Algorithmic techniques needed in problem solving. Relative efficiency of algorithms. Topics will include efficient algorithms for data manipulation, graphical analysis, rapid evaluation of algebraic functions and matrix operations, and NlogN 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 442 Object-Oriented Software Engineering (3 credits†)

Prerequisite: COMP 342

A project course in the development of a large-scale software system using OO methodologies. The primary process involves discovering classes and objects which 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/MATH 445 Logic Programming (3 credits†)

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

The study of propositional and first order predicate logic from an axiomatic point of view. Algorithmic methods of theorem proving will be emphasized.

COMP/MATH 460 Introduction to Robotics (3 credits†)

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

An introduction to the theory of the motion of robot manipulators. The mathematics, programming and control of manipulators will be emphasized. Also examined will be issues of sensing and planning.

COMP 470 Introduction to Artificial Intelligence (3 credits†)

Prerequisite: 24 credits in approved computer science courses for computer science majors

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

† May be taken for graduate level credit.

Note: *This section is arranged in course number order. See course prefix key for assistance in locating department sections.*

Departmental Honors Committee and the thesis director this course may be extended into a second semester for three additional credits depending 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
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
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 undertaken by the graduate student in his field. For details, consult the paragraph entitled "Independent Study" in the *Graduate and Continuing Education* 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
Designed for the graduate student who desires to study selected topics in a specific field. For details consult the paragraph entitled "Independent Study" in the *Graduate and Continuing Education* section of this catalog. This course may be repeated.

COMP 510 Topics in Programming Languages (3 credits)
Prerequisite: Consent of the 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: Consent of the 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. Includes: 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: Consent of the instructor
Topics include lexical and syntactic analysis; code generation; error detection and correction; optimization techniques; models of code generators; incremental and interactive compiling. Students design and implement a compiler.

COMP 530 Software Engineering (3 credits)
Prerequisite: Consent of the instructor
Topics 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: Consent of the 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.

COMP 540 Automata, Computability, and Formal Languages (3 credits)
Prerequisite: Consent of the instructor
Topics 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: Consent of the 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 550 Topics in Discrete Mathematics (3 credits)
Prerequisite: Consent of the instructor
Topics include context-free languages, graph theory, combinatorics, optimization theory, linear programming, error correcting codes.

COMP 560 Artificial Intelligence (3 credits)
Prerequisite: Consent of the 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. The main current systems are surveyed along with expert system environments and tools.

COMP 565 Logic Programming (3 credits)
Prerequisite: Consent of the 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: Consent of the 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, automated factory design.

COMP 575 Natural Language Processing (3 credits)
Prerequisite: COMP 560
This is an 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; generation of text or speech.

COMP 580 Database Systems (3 credits)
Prerequisite: Consent of the instructor
Topics 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; dedicated processors, information retrieval, real time applications.

COMP 582 Distributed Database Systems (3 credits)
Prerequisite: COMP 580
The problems inherent in distributed data bases on a network of computer systems are studied including file allocation, directory systems, deadlock detection and prevention, synchronization, query optimization, and fault tolerance.

COMP 590 Computer Architecture (3 credits)
Prerequisite: Consent of the 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; theoretical aspects of parallel and pipeline computation.

COMP 594 Computer Networks (3 credits)
Prerequisite: Consent of the 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: Consent of the instructor
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
A project oriented seminar in computer science. Projects will be individually assigned.

Other Approved Courses:
COMP 200 FORTRAN
COMP 280 Fundamentals of Microprocessors and Microcomputers
COMP 336 File Processing and Business Applications

† May be taken for graduate level credit.

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