



*COMPUTER SCIENCE
DEPARTMENT*

Advisement Bulletin



FALL 2007

UNIVERSITY OF WISCONSIN OSHKOSH

Computer Science Department

Halsey 229

Phone (920) 424-2068

Fax (920) 424-0045

website: http://www.uwosh.edu/departments/computer_science/

FACULTY

Robert Ball	Assistant Professor, Ph.D. Virginia Tech ballr@uwosh.edu
Kathy Faggiani	Assistant Professor, Ph.D. University of Colorado, Boulder faggianik@uwosh.edu
David Furcy	Assistant Professor, Ph.D. Georgia Institute of Technology furcyd@uwosh.edu
George Georgiev	Associate Professor, Ph.D. Technical University, Bulgaria georgiev@uwosh.edu
Wing Huen	Associate Professor, Ph.D. Carnegie-Mellon University huen@uwosh.edu
Kathy Lynch	Lecturer, M.S. Texas A&M University lynchk@uwosh.edu
Thomas Naps, Chair	Professor, Ph.D. University of Notre Dame naps@uwosh.edu

ADMISSION/GRADUATION REQUIREMENTS

As of this writing the Computer Science Department has no admission requirements for the Computer Science major. Therefore any student who chooses to do so may enroll as a Computer Science major.

To be eligible for graduation, students must meet all requirements for the degree being sought in addition to earning a minimum grade point average of 2.00 in all courses required for the Computer Science major or minor.

In addition to University and College requirements, students must have a minimum grade point average of 2.00 in those computer science (Comp Sci) courses numbered 300 or above that are used to satisfy the requirements of the Computer Science major excluding Comp Sci 399, Comp Sci 446, Comp Sci 456, Comp Sci 474, and Comp Sci 490.

Please note that this statement implies that if a student completes more than the minimum number of courses required for a specific emphasis, the student may designate those courses that will be used for computing the grade point average when more than one choice is possible. The resulting set of designated courses must satisfy the requirements of a specific emphasis of the Computer Science major.

Requirements for Wisconsin teacher certification in Computer Science include a minimum grade point average of 3.00 in all courses required for the major or minor in order to meet the requirements of the College of Education and Human Services. Possible additional requirements are currently under study by the Wisconsin Department of Public Instruction.

COMPUTER SCIENCE PROGRAM OBJECTIVES

- Graduates will have an in-depth knowledge of a wide range of areas in computer science, and an understanding of the fundamental mathematical, statistical, and scientific principles underlying computing.
- Graduates will be prepared for entry-level positions as computing professionals at the regional and national levels, and for the pursuit of advanced degrees via graduate study.
- Graduates will be prepared to communicate effectively both orally and in writing and to work effectively with others.
- Graduates will have an appreciation and understanding of the societal implications of computing and of the ethical behavior expected of professionals in the field.

PREREQUISITES

The Computer Science Department has established prerequisites for each course so that students will be adequately prepared for the topics covered in the course. This allows the instructor to proceed with the course in a manner that assures quality in the program.

The department strictly enforces the prerequisite policy. You should not take courses unless you satisfy the prerequisites. Otherwise, when the deficiency is detected, you will have to drop the course. All courses are checked.

REPEATING COURSES

The College of Letters and Science and the Computer Science Department permits student to repeat a given computer science course **one time only**. Note that this policy includes transfer courses. A very important consequence of this policy is that a student who does not earn a grade of C or better in certain courses that are prerequisites for a required course must withdraw from the Computer Science major. For example, suppose a student earns a D grade in CompSci 271 Data Structures. Then s/he repeats it and earns a CD grade. Because CompSci 271 is a prerequisite for most 300-level courses, s/he will not be permitted to major in Computer Science.

THE COMPUTER SCIENCE MAJOR

The requirements for a major in Computer Science consists of the Common Core plus courses listed under any one of three emphases: Computer Science, Software Engineering, and Computer Information Systems.

The Common Core (Majors)

These courses are required of all Computer Science **Majors**.

1. Comp Sci 221 Objected-Oriented Design and Programming I	3 cr.
2. Comp Sci 251 Computer Organization and Assembler Programming	3 cr.
3. Comp Sci 262 Object-Oriented Design and Programming II	4 cr.
4. Comp Sci 271 Data Structures	4 cr.
5. Comp Sci 331 Programming Languages	3 cr.
6. One of the following:	
Comp Sci 399 Internship in Computer Science	
Comp Sci 490 Practicum in Computer Science	3 cr.
7. Math 122 Mathematics for Computer Science	3 cr.
8. Physics 311 Digital Instrumentation	<u>4 cr.</u>
Total:	27 cr.

Important Note: The Physics 311 course requirement also satisfies the one-semester laboratory science course requirement for the B.S. degree, as long as the two-course laboratory science sequence is taken from courses in a department other than Physics.

COMPUTER SCIENCE MAJOR REQUIREMENTS

Emphasis I. Computer Science

This emphasis focuses on the fundamental practical and theoretical foundations of computer science, providing an in-depth understanding of both the software and hardware components of computer systems. It is appropriate for students preparing for careers in scientific computing or research, and for students planning to pursue graduate degrees. This is the only emphasis that is accredited by the Computing Accreditation Commission of ABET (Accreditation Board for Engineering and Technology), a national organization recognized by the Council for Higher Education Accreditation.

Requirements in addition to the Computer Science Core:

1. Comp Sci 310 Computer Architecture	3 cr.
2. Comp Sci 321 File Structures	3 cr.
3. Comp Sci 350 Ethical Issues in Computing	1 cr.
4. Comp Sci 381 Theory of Computing	3 cr.
5. Comp Sci 421 Operating Systems	4 cr.
6. Comp Sci 431 Compilers	4 cr.
7. CompSci 499 Computer Science Assessment	0
cr.	
8. Math 171 Calculus I	4 cr.
9. Math 172 Calculus II	4 cr.
10. Math 301 Introduction to Probability and Statistics	3 cr.
11. Electives: 6 credits from elective list A (p.9). The chosen electives must not appear above as requirements for the Computer Science emphasis.	<u>6 cr.</u>
Total:	35 cr.

Important Notes:

1. The Computer Science Emphasis is open only to students pursuing the B.S. degree.
2. If Physics 311 is used to satisfy the one-semester laboratory science course requirement for the B.S. degree, then an additional math or physics course from Elective List C, or a math or science course not on Elective List C that is approved by the Computer Science Department, is required.

Emphasis II. Software Engineering

This emphasis focuses on knowledge and skills for the design, development, maintenance, and management of software, including software for the operation of instrumentation. It is appropriate for students preparing for careers as systems programmers, systems analysts, software engineers, or computer-based instrumentation specialists.

Requirements in addition to the Computer Science Core:

- | | |
|---|---------------|
| 1. Comp Sci 321 File Structures | 3 cr. |
| 2. Comp Sci 341 Software Engineering I | 3 cr. |
| 3. CompSci 342 Software Engineering II | 3 cr. |
| 4. Comp Sci 361 Database Systems | 3 cr. |
| 5. Either Comp Sci 421 Operating Systems or Comp Sci 431 Compilers | 4 cr. |
| 6. Either Math 171 Calculus I or Math 206 Mathematics for Business Analysis II | 4 cr. |
| 7. Either Math 201 Applied Statistics, Math 301 Introduction to Probability and Statistics, or Econ 210 Economic and Business Statistics | 3 cr. |
| 8. Electives: 3 credits from elective list A, and 6 credits from lists B and C combined (pp. 9-10). The chosen electives must not appear above as requirements for the Software Engineering emphasis.
<u>9 cr.</u> | |
| Total: | 32 cr. |

Important Notes:

1. The College of Business (COBA) has a grade point restriction for enrolling in upper level business courses. Therefore if your overall GPA falls below that restriction level, you must either postpone taking MIS courses until your GPA improves, or you must change your emphasis.
2. For prerequisite purposes only, COBA permits the following substitutions of CompSci courses for COBA courses:

MIS pre-req course:	Comp Sci Course that may be used in place of the MIS course, to satisfy pre-req:
Bus 314: Sys Analys & Design	Comp Sci 341: Software Engineering

Bus 315: DataBase Sys in Business Comp Sci 361: Database
Bus 355: Networking & Data Com Comp Sci 391: Data Com & Computer Networks

COMPUTER SCIENCE MAJOR REQUIREMENTS (Continued)

Emphasis III. Computer Information Systems

This emphasis focuses on knowledge and skills for designing, implementing, and administering application software, including network administration and database administration, computerization plan preparation, and user requirement specification preparation. It is appropriate for students preparing for careers as systems administrators, network managers, or application programmers.

Requirements in addition to the Computer Science Core:

1. Comp Sci 361 Database Systems	3 cr.
2. Comp Sci 346 Web Software Development	3 cr.
3. Comp Sci 341 Software Engineering I	3 cr.
4. Either Math 206 Mathematics for Business Analysis or Math 171 Calculus I	4 cr.
5. Either Math 201 Applied Statistics, Math 301 Introduction to Probability and Statistics, or Econ 210 Economic and Business Statistics	3 cr.
6. Electives: 9 credits from elective list A, and 6 credits from list B (p.9). The chosen electives must not appear above as requirements for the Computer Information Systems emphasis.	<u>15 cr.</u>
Total:	31 cr.

Important Notes:

1. The College of Business (COBA) has a grade point restriction for enrolling in upper level business courses. Therefore if your overall GPA falls below that restriction level, you must either postpone taking MIS courses until your GPA improves, or you must change your emphasis.
2. For prerequisite purposes only, COBA permits the following substitutions of CompSci courses for COBA courses:

MIS pre-req course:	Comp Sci Course that may be used in place of the MIS course, to satisfy pre-req:
Bus 314: Sys Analys & Design	Comp Sci 341: Software Engineering
Bus 315: DataBase Sys in Business	Comp Sci 361: Database
Bus 355: Networking & Data Com	Comp Sci 391: Data Com & Computer Networks

COMPUTER SCIENCE MAJOR REQUIREMENTS (Continued)

Elective Lists

List A: Computer Science courses

1. Comp Sci 300 Artificial Intelligence
2. Comp Sci 310 Computer Architecture
3. Comp Sci 321 File Structures
4. Comp Sci 341 Software Engineering I
5. Comp Sci 342 Software Engineering II
6. Comp Sci 346 Web Software Development
7. Comp Sci 350 Ethical Issues in Computing
8. Comp Sci 361 Database Systems
9. Comp Sci 371 Computer Graphics
10. Comp Sci 381 Theory of Computing
11. Comp Sci 391 Computer Networks
12. Comp Sci 421 Operating Systems
13. Comp Sci 431 Compilers
14. Comp Sci 480 Topics in CS

List B: MIS Courses

1. Business 314 Information Systems Analysis and Design
2. Business 315 Database Systems in Business
3. Business 319 MIS Topics
4. Business 355 Network and Telecomm Systems
5. Business 410 Application Software Design
6. Another MIS course approved in advance by the Computer Science department

COMPUTER SCIENCE MAJOR REQUIREMENTS (Continued)

Elective Lists (continued)

List C: Physics and Mathematics courses

Physics:

1. Physics 305 Electronic Circuits & Devices
2. Physics 319 Digital Signal Processing
3. Physics 405 Modern Instrumentation & Interfacing
4. A Physics course approved in advance by the Computer Science department

Mathematics:

1. Math 222 Introduction to Abstract Mathematics
2. Math 256 Algorithmic Matrix Algebra with Models
3. Math 302 Intermediate Statistical Methods
4. Math 304 Introduction to Nonparametric Methods
5. Math 342 Abstract Algebra I
6. Math 346 Linear Algebra
7. Math 349 Number Theory
8. Math 355 Introduction to Numerical Analysis
9. Math 356 Linear Numerical Analysis
10. Math 357 Linear Programming
11. Math 371 Differential Equations
12. Math 385 Applied Regression
13. Math 401 Mathematical Statistics I
14. Math 402 Mathematical Statistics II
15. A Mathematics course approved in advance by the Computer Science department

The Computer Science MINOR

The Common Core (Minor)

These courses are **required** of all Computer Science **Minors**.

<u>Course</u>	<u>Credits</u>
1. Comp Sci 221 Object-Oriented Programming I	3 cr.
2. Comp Sci 251 Computer Organization and Assembler Programming	3 cr.
3. Comp Sci 262 Object-Oriented Programming II	4 cr.
4. Comp Sci 271 Data Structures	<u>4 cr.</u>
Total	14 cr.

Elective Computer Science Courses

(9-11 credits)

Any **three** courses may be selected from the following upper-division offerings.

Comp Sci 300 Artificial Intelligence	3 cr.
Comp Sci 310 Computer Architecture	3 cr.
Comp Sci 321 File Structures	3 cr.
Comp Sci 331 Programming Languages	3 cr.
Comp Sci 335 Windows and GUI Programming	2 cr.
Comp Sci 341 Software Engineering I	3 cr.
Comp Sci 342 Software Engineering II	3 cr.
Comp Sci 346 Web Software Development	3 cr.
Comp Sci 361 Database Systems	3 cr.
Comp Sci 371 Computer Graphics	3 cr.
Comp Sci 381 Introduction to the Theory of Computing	3 cr.
Comp Sci 391 Data Communication and Computer Networks	3 cr.
Comp Sci 421 Operating Systems	4 cr.
Comp Sci 431 Compilers	4 cr.
Comp Sci 480 Advanced Topics in Computer Science	3 cr.
Comp Sci 490 Practicum in Computer Science	<u>3 cr.</u>
Total:	23-25 cr.

Course Offerings

Courses offered every semester (Fall, Spring)
115 Using Computers
125 World Wide Web Site Development
142 Elementary Programming in Visual Basic
221 Object-Oriented Design and Programming I
251 Computer Organization and Assembly Language
262 Object-Oriented Design and Programming II
271 Data Structures
399 Internship
490 Practicum

Courses offered every Fall
321 File structures
341 Software Engineering I
346 Web Software Development
431 Compilers

Courses offered every Spring
331 Programming Languages
342 Software Engineering II
350 Ethical Issues in Computing
361 Database Systems
421 Operating Systems

Courses offered every third semester
300 Artificial Intelligence
310 Computer Architecture
334 Advanced Visual Basic Programming
335 Windows and GUI Programming
371 Computer Graphics
381 Theory of Computing
391 Computer Networks
480 Topics in Computing

Three-semester course rotation schedule					
Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2008
310	391	300	310	391	300
334/5	480	381	334/5	480	381
371			371		

3-YEAR COURSE OFFERING STRATEGY

SUGGESTED COURSE SEQUENCES

Prerequisite course requirements are strictly adhered to. Even so, many good arrangements of computer science courses exist. The following is a sampling you may wish to consider. The variations are driven by the meeting of prerequisites for CompSci 221.

- CS Computer Science Course
- M Math Course
- P Physics Course
- Elec Computer Science Elective

Plan 1 {Emphasis I}

Semester	1	2	3	4	5	6	7	8
	CS-221	CS-262	CS-251	CS-331	M-301	CS-421	CS-431	CS-490/399
	M-171	M-172	CS-271	P-311	CS-310	CS-350	Elec	CS-381
		M-122			CS-321	Elec		

Plan 2 {Emphasis II}

Semester	1	2	3	4	5	6	7	8
	CS-221	CS-262	CS-271	CS-251	CS-341	CS-331	CS-431	CS-421
	M-122	Calculus	P-311	Statistics	CS-321	CS-361	Elec	CS-490/399
					Elec	CS-342		Elec

Plan 3 {Emphasis II}

Semester	1	2	3	4	5	6	7	8
	CS-221	CS-262	CS-271	P-311	CS-341	CS-331	CS-490/399	CS-421
	M-108	Calculus	CS-251	Statistics	CS-321	CS-361	Elec	Elec
		M-122			Elec	CS-342		Elec

Plan 4 {Emphasis II}

Semester	1	2	3	4	5	6	7	8
	M-104	CS-221	CS-262	CS-271	CS-321	CS-331	CS-431	CS-490/399
		M-106	Calculus	CS-251	CS-310	CS-361	CS-341	CS-342
			M-122	P-311	Statistics	Elec	Elec	Elec

Plan 5 {Emphasis III}

Semester	1	2	3	4	5	6	7	8
	M-104	CS-221	CS-262	CS-271	CS-341	CS-331	Elec	Elec
		M-106	M-122	CS-251	Elec	CS-361	Elec	CS-346
			Calculus	Statistics	P-311		CS-490/399	Elec

Your Plan:

Semester	1	2	3	4	5	6	7	8

CHECK LIST OF PROGRESS TOWARDS MAJOR

Use this sheet to record your progress toward the major

Emphasis I

Computer Science Required

1. CS-221____
2. CS-251____
3. CS-262____
4. CS-271____
5. CS-310____
6. CS-321____
7. CS-331____
8. CS-350____
9. CS-381____
10. CS-421____
11. CS-431____
12. One of:

 CS-399____
 CS-490____

Computer Science Electives

1. _____
2. _____

Mathematics Required

1. Math-171 _____
2. Math-172 _____
3. Math-122 _____
4. Math-301 _____

Physics Required

1. Physics-311 _____

Emphasis II:

Computer Science Required

1. CS-221____
2. CS-251____
3. CS-262____
4. CS-271____
5. CS-321____
6. CS-331____
7. CS-341____
8. CS-342____
9. CS-361____
10. one of
 CS-421____
 CS-431____
11. one of
 CS-399____
 CS-490____

Computer Science Electives

1. _____
2. _____
3. _____

Mathematics Required

1. Calculus _____
2. Math-122 _____
3. Statistics _____

Physics Required

1. Physics-311 _____

Emphasis III:

Computer Science Required

1. CS-221____
2. CS-251____
3. CS-262____
4. CS-271____
5. CS-331____
6. CS-341____
7. CS-346____
8. CS-361____
9. one of:
 CS-399____
 CS-490____

Computer Science Electives

1. _____
2. _____
3. _____
4. _____
5. _____

Mathematics Required

1. Math-122 _____
2. Calculus _____
3. Statistics _____

Physics Required

1. Physics-311 _____

COURSE OFFERINGS

Prerequisites for the courses are given.

Up-to-date descriptions for the courses can be found on our web site at

http://www.uwosh.edu/computer_science/cs_major/courses_description.php

CompSci-115 USING COMPUTERS Credits: 3 (Fall, Spring)

This course introduces students to computers and their use. The course emphasizes productivity tools such as word processing, spread sheet and internet application packages. Emphasis will be placed on methodologies that acquire, organize, analyze, synthesize, and present data.

Prerequisite: Eligible to enroll in Math-103 via math placement exam or high school record.

Not open to students who have completed CompSci-271. Students may not earn credit for both CompSci-115 and Business Administration-210. This course does not apply toward the Computer Science major or minor.

CompSci-125 WORLD WIDE WEB SITE DEVELOPMENT Credits: 3 (Fall or Fall Interim, Spring)

An introduction to the tools for developing World Wide Web pages. Topics covered include: Internet history, overview of file transfer, remote login, electronic mail, introduction to Hyper Text Markup Language (HTML), incorporating graphics, clip art and other multimedia materials, techniques and principles of effective presentation and uploading files to a server.

Not open to students who have completed CompSci-271. This course does not apply toward the Computer Science major or minor.

CompSci-142 ELEMENTARY PROGRAMMING IN VISUAL BASIC Credits: 3 (Fall, Spring)

A service course in computer programming using the language Visual Basic. Topics covered include problem solving, algorithms, selection statements, repetition, arrays, functions and sub-programs.

Prerequisites: Math-103 with grade of C or better or qualifying for either Math-104 or Math-171 via math placement exam.

Not open to students who have completed CompSci-271. This course does not apply toward the Computer Science major or minor.

CompSci-221 OBJECT-ORIENTED DESIGN AND PROGRAMMING I Credits: 3
(Fall, Spring)

A first course in problem solving, software design, and computer programming using the Java language. Problem solving/software design techniques will be drawn from: flow charts, pseudo code, structure charts, and class diagrams. Data structures and algorithms include: Arrays, character strings, searching, and sorting. Programming topics include: data types, assignment statements, standard input/output, selection, repetition, functions/methods, parameters, scope of identifiers, data file input/output, recursion, and simple GUIs.

Prerequisite: A grade of C or better in Math-104 or Math-108 or Math-206 or Comp Sci-142, or qualifying for Math-171 via the Mathematics Placement Exam.

CompSci-251 COMPUTER ORGANIZATION AND ASSEMBLER LANGUAGE
Credits: 3 (Fall, Spring)

An introduction to RISC-based instruction set architecture. Topics to be studied include: data representation, assembly language programming, and introduction to system software.

Prerequisite: CompSci-221 with a grade of C or better.

CompSci-262 OBJECT ORIENTED PROGRAMMING DESIGN & PROGRAMMING II
Credits: 4 (Fall, Spring)

A second course in problem solving, software design, and computer programming using the Java language. Problem solving/software design topics will be drawn from: abstract data types, universal modeling language (UML), and finite-state machines (FSM). Data structures and algorithms include: recursive sorting, implementation of linked lists, stacks, queues, and use of other collection classes. Programming topics include: recursion, inheritance, polymorphism, templates, and graphical user interfaces.

Prerequisite: Math-108 or equivalent with a grade of C or better, or qualifying for a higher level mathematics course via the Mathematics Placement Exam, and CompSci-221 or equivalent with a grade of C or better.

CompSci-271 DATA STRUCTURES Credits: 4 (Fall, Spring)

A course surveying the fundamental methods of representing data in memory and the algorithms which access data, using the C++ language. Data structures and algorithms include: trees, heaps, priority queues, hashing, searching, sorting, graphs, and elementary analysis of algorithms. Programming topics include: dynamic memory allocation, pointers, templates, and the C++ Standard Template Library (STL).

Prerequisite: CompSci-262 with a grade of C or better.

CompSci-300 ARTIFICIAL INTELLIGENCE Credits: 3 (Every 3rd semester)

This course is a survey of existing techniques in the field of artificial intelligence. An introduction to the areas of robotics, theorem proving, heuristic programming, natural language processing, neural networks, and game playing is presented. Students are expected to demonstrate mastery via computer programs using the techniques of artificial intelligence.

Prerequisite: CompSci-262 with a grade of C or better.

CompSci-310 COMPUTER ARCHITECTURE Credits: 3 (Every 3rd semester)

An introduction to digital logic and computer hardware organization. The students are introduced to elementary Boolean algebra and switching theory as related to computer architecture. Emphasis is given to the design of Central Processing Units, Arithmetic and Logic Units, and main memories. A comparison of alternate computer organizations is presented.

Prerequisite: CompSci-251, and Math-122, with a grade of C or better. Prerequisite or concurrent enrollment: Physics-311.

NOTE: Physics-311 satisfies the second discipline (third course) laboratory science course requirement for the B.S. degree.

Required for Emphasis I.

34-321 FILE STRUCTURES Credits: 3 (Fall)

This course is a continuation of the data structures course. It is a study of the representation of data and the algorithms for storing and retrieving data on secondary memory devices. The following topics are covered: magnetic tape and magnetic disk, binary and text file representations, sequential files, blocking, buffering, relative files, static and dynamic hash files, indexed files via B trees, indexed-sequential files via B+ trees, inverted files, file control specifications, external sorting algorithms, spooling and file systems.

Prerequisites: CompSci-251 and CompSci-271 both with a grade of C or better.

Required for Emphases I and II.

CompSci-331 PROGRAMMING LANGUAGES Credits: 3 (Spring)

A study of programming languages. Topics covered include: formal syntactic description, methods of implementation, and language features such as recursion, block structure, string processing, and list processing. Specific high level programming languages are studied to demonstrate the use of these language features.

Prerequisites: CompSci-251 and CompSci-271 both with a grade of C or better.

Required for Emphasis I, II, and III.

CompSci-334 ADVANCED VISUAL BASIC PROGRAMMING Credits: 1
(Every 3rd Semester)

The objectives of this course are to provide fast-paced coverage of writing Windows applications in Visual Basic to students who already have substantial programming experience in another language. The course will describe Visual Basic in the context of Microsoft's .NET framework and focus on a number of advanced concepts. These concepts will include, but are not limited to, the event-handling model, object-oriented programming, a wide range of GUI controls, file-handling, database access, ASP, .NET, Web forms, and Web controls.

Prerequisites: CompSci-262 with a grade of C or better.

This course does not count toward the CompSci major. It does count for credit toward the degree.

CompSci-335 WINDOWS AND GUI PROGRAMMING Credits: 2 (Every 3rd Semester)

Revised description: This course examines modern Windows and GUI programming and design techniques, using the Microsoft.Net framework as a basis. The course will include an overview and history of GUI programming. The C# language will be studied, along with an introduction to back-end database (ADO.Net) connectivity within .Net, and its role in the tiered structure of modern application design. Web-based forms and Active Server Pages (ASP.Net) will be covered, along with the recent concept of XML Web Services. Finally, the course will look at aspects of components, deployment and class design within the .Net environment, concluding with other advanced .Net techniques such as Reflection.

Prerequisites: CompSci-334 with a grade of C or better.

This course does not count toward the CompSci major. It does count for credit toward the degree.

CompSci-341 SOFTWARE ENGINEERING I Credits: 3 (Fall)

This course will provide an in-depth study and analysis of at least one large scale software system. Students will analyze, design, and partially implement an extensive software project. Case studies will address major system concerns such as specification, classification, inter-relationships, validation, and evaluation. Other topics include the use of UML, prototyping, data flow diagrams and CASE tools.

Prerequisites: CompSci-251 and CompSci-271 both with a grade of C or better.

Required for Emphases II and III.

CompSci-342 SOFTWARE ENGINEERING II Credits: 3 (Spring)

Software Engineering II is the second of a two-semester sequence on the topic of modern Software Engineering tools and techniques. Topics covered include Design Patterns, the Unified Modeling Language (UML), Component-based Software Development, Advanced OO Design and Analysis, Refactoring, and other techniques such as Extreme Programming.

Prerequisite: CompSci-341 with a grade of C or better.

Required for Emphasis II.

CompSci-346 WEB SOFTWARE DEVELOPMENT Credits: 3 (Fall)

An introduction to the tools for developing internet applications. Topics covered include: Internet history, the HyperText Markup Language, graphic images and manipulation, multimedia, programming in the JavaScript and PERL languages.

Prerequisite: CompSci-262 with a grade of C or better.

Required for Emphasis II.

CompSci-350 ETHICAL ISSUES IN COMPUTING Credits: 1 (Spring)

A study of the evolution of computing, its implications for society, and the ethical issues underlying those implications. This course will focus on reading the current literature regarding these issues and on presenting the pros and cons of such issues in both oral and written fashion. The course is required for all Computer Science majors in the Computer Science Emphasis and is strongly recommended for all Computer Science majors.

Prerequisites: Junior standing and departmental permission.

Required for Emphasis I and recommended for all majors.

CompSci-361 DATABASE SYSTEMS Credits: 3 (Spring)

An introduction to database processing with emphasis on database techniques, design, and modeling. Programming projects include implementation of selected database processing methods and the use of database software.

Prerequisite: CompSci-271 with a grade of C or better.

Required for Emphases II and III.

CompSci-371/571 COMPUTER GRAPHICS Credits: 3 (Every 3rd semester)

An introduction to the mathematics, data structures, and algorithms used to create both 2D and 3D graphical output. 2D topics include viewing transformation, clipping, scan conversion, geometric transformations, hierarchical modeling and animation. 3D topics include projections, viewing systems, back face culling, polygon clipping, wireframe images, visible surface algorithms, Phong reflection model, Gouraud and Phong shading techniques, color dithering, color quantization, ray tracing and Bezier patches.

Prerequisites: CompSci-271 and Math-171 both with a grade of C or better.

CompSci-381 INTRODUCTION TO THE THEORY OF COMPUTING Credits: 3
(Every 3rd semester)

An introduction to the basic concepts in the theory of computing. Topics covered will include automata theory, formal languages, Turing machines, the Chomsky Hierarchy, and undecidability.

Prerequisites: CompSci-271 and either Math-122 or Math-222 both with a grade of C or better.

Required for Emphasis I.

CompSci-391/591 DATA COMMUNICATIONS AND COMPUTER NETWORKS
Credits: 3 (Every 3rd semester)

An introductory course which covers the basic concepts in data communication and computer networks. Topics covered will include the nature of data communication, characteristics of computer networks, the ISO-OSI network protocol layers, error detection and correction codes, and network performance considerations

Prerequisites: CompSci-251, CompSci-271 and Math-122 or Math-222 all with a grade of C or better.

CompSci-421 OPERATING SYSTEMS Credits: 4 (Spring)

An introduction to operating systems concepts. Topics covered include: interrupts, memory allocation, virtual memory techniques, process scheduling and synchronization, deadlocks, resource allocation, and file systems. A major programming project will be assigned to provide experience with operating system design.

Prerequisites: CompSci-271 and Math-122, both with a grade of C or better.

NOTE: The Computer Science Department will accept courses similar to CompSci-421 and CompSci-431 from all other schools as counting toward the list of “elective courses”, but not the list of “required courses”.

Required for Emphasis I. This course or CompSci-431 is required for Emphasis II.

CompSci-431 COMPILERS Credits: 4 (Fall)

An introduction to compiler writing techniques for translating a higher level programming source language into a lower level target language. Topics to be covered include: definition of programming languages, lexical and syntactic analysis, low level code generation and optimization, run time systems, and error detection, reporting, and recovery. A major programming project will be assigned to provide experience with compiler design.

Prerequisites: CompSci-331 and Math-122, each with a grade of C or better.

NOTE: The Computer Science Department will accept courses similar to CompSci-431 from all other schools as counting toward the list of "elective courses", but not the list of "required courses".

Required for Emphasis I. This course or CompSci-421 is required for Emphasis II.

CompSci-480 TOPICS IN COMPUTER SCIENCE Credits: 3 (Every 3rd semester)

A topic of current interest in computer science will be investigated by faculty and qualified students. In addition to lectures by faculty, the students will be responsible for research and presentation of selected aspects of the topic. The course may be repeated for credit if the topic is different, and the student has the consent of department. Graduate students will be required to do an extra programming project or paper.

Prerequisites: A grade of C or better in CompSci-271 and consent of instructor.

COMPSCI-499 COMPUTER SCIENCE ASSESSMENT Credits: 0 (Fall, Spring)

Students will take the Educational Testing Service Major Field Test (MFT) in Computer

Science. Required of all students in the Computer Science Emphasis. Those who take the test will receive a passing grade.

Pass/Fail course.

PRACTICUM and INTERNSHIP

The courses CompSci-399 Internship in Computer Science and CompSci-490 Practicum in Computer Science are designed to be the capstone courses for the major or minor. Either course satisfies the Writing

Emphasis requirement in the Computer Science Department. Each semester a faculty member in the Computer Science department is assigned the duties of being the "Practicum & Internship Coordinator". The name of and the times to see the coordinator are posted in the departmental office each semester.

CompSci-399 INTERNSHIP IN COMPUTER SCIENCE Credits: 3

Prerequisites: 75 credits toward graduation, six credits of 300-400 level Computer Science courses, and GPA of 3.00 in Computer Science courses.

An internship experience with a cooperating organization or corporation to provide on-the-job learning. This course satisfies the Writing Emphasis requirement for the Computer Science major.

CompSci-490 PRACTICUM IN COMPUTER SCIENCE Credits: 3

Prerequisites: 75 credits toward graduation and six credits of 300-400 level Computer Science courses.

A project-oriented course that brings together the material learned in previous computer science courses. The student will investigate and solve a problem(s) under supervision. This course satisfies The Writing Emphasis requirement for the Computer Science major.

During any semester, the coordinator is the only faculty member who discusses the mechanics and approves practicums and internships for that semester or any future semester.

Mechanics of the practicum and internship:

1. Talk to the coordinator one or two semesters before you intend to enroll!
2. The proposal must actually be a "proposal" of a project **yet to be done**. Any proposal for projects which have already been essentially completed will be approved only by "petition"; the approval will require departmental action.
3. You always need an add card to enroll in practicum or internship. The add card is signed by the practicum and internship coordinator **at the time** the proposal is approved. **You are encouraged to have your proposal approved the semester before you enroll in the course!** This means that if you intend to earn credit during the Fall of 2008, you should have your proposal approved during Spring or Summer of 2007.
4. The last date to enroll in Practicum or Internship will be the end of the fourth week of the semester you plan on being enrolled in this course. (Summers: End of the second week).
5. Writing Emphasis:
 - One credit of the grade is based on written work done during the practicum/internship.
 - The written assignments include: three progress reports, and the final report. A training journal is also required for the internship.
 - The written work will be submitted to the Practicum/Internship Coordinator for comments and revised until accepted by the Practicum/Internship Coordinator.
6. A final oral presentation is required for both practicum and internship.
7. Practicum and Internship are seventeen week courses. You will receive a grade of incomplete for the practicum or internship, if you have not completed the work by the last date for completing work in a semester. This could affect your graduation date.