

# **North Carolina Agricultural & Technical State University**



## **College of Engineering**

### **Computer Science Department**

# **Bachelor of Science** **in** **Computer Science**

## **Undergraduate Student Handbook**

*(Last Curriculum Update- Fall 2012)*

*(Last Handbook Update –May 30, 2012)*

**Phone: 336-334-7245**

**Fax: 336-334-7244**

## Table of Contents

Introduction.....	3
Vision .....	3
Objectives.....	3
Accreditation .....	4
Admission Policies .....	4
Policy for Changing Major to Computer Science.....	4
Policy on Undergraduate Students Receiving Credit by Examination.....	5
Computer Science Department Policy on Cheating:.....	5
Minimum Grade of "C" Policy .....	5
Curriculum Guide for a Bachelors of Science in Computer Science .....	6
Curriculum Guide for a Bachelors of Science in Computer Science (For students needing Pre-Calculus) .....	7
Curriculum Guide for a Bachelors of Science in Computer Science with Concentration in Information Assurance .....	8
Required Computer Science & Computer Programming Courses .....	9
Computer Science Electives .....	9
Computer Science Electives Offered in other Departments .....	10
Mathematics .....	10
Science .....	10
General Education Requirements .....	11
Business & Economics Group Electives .....	11
Prerequisites for Computer Science Required Courses .....	12
Course Descriptions .....	14
Faculty Advisors for Undergraduate Students.....	21

North Carolina A&T State University is committed to equality of educational opportunity and does not discriminate against applications, students, or employees based on race, color, national origin, religion, sex, age, sexual orientation, or handicap. Moreover, North Carolina A&T State University is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of white students.

250 copies of this document were printed at a cost of \$0.30 per copy

## Introduction

This handbook provides information about the Bachelor of Science Degree in Computer Science at North Carolina A&T State University. This handbook serves as a guide to students majoring or interested in majoring in Computer Science. Please also see the North Carolina A&T State University Undergraduate Bulletin for general information concerning undergraduate students.

## Vision

It is the vision of the Computer Science Department that we will produce high quality graduates who will be among the top professionals and researchers in the computing field, and who will be outstanding contributors in enhancing the quality of life for future generations.

## Objectives

The objectives of the Department of Computer Science are to:

1. Provide high quality education in computer science through exemplary teaching, scholarly research, and public service, focused on preparing our student to be distinctive leaders and significant contributors to society.
2. Provide a broad base in the design, implementation, and application of computer software systems and a functional background in computer hardware systems. This primary objective strives to impart lasting theoretical concepts and fundamental skills to prepare the students for lifelong learning as well as to familiarize them with current technology.
3. Give the student the opportunity to develop a well rounded background as an overall articulate individual by requiring study in written and oral communication, natural and social sciences, humanities and the arts, business and economics, as well as promoting their participation in social and professional activities.
4. Prepare students for advanced scholarly endeavors in computer science.
5. Develop professional skills and work ethics (ethics in the workplace and the ethics of working hard).

The educational objectives of the Computer Science Undergraduate Program are:

Each graduate of the program should be able to:

1. Perform effectively in a computer science related position in industry.
2. Perform effectively in graduate programs where an undergraduate degree in computer science is required.
3. Communicate ideas and interact effectively with others to accomplish desired goals.

The Computer Science Program enables students to achieve the following outcomes by the time of graduation:

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs.
- d. An ability to function effectively on teams to accomplish a common goal.

- e. An understanding of professional, ethical, and social responsibilities.
- f. An ability to communicate effectively.
- g. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security, and global policy issues.
- h. Recognition of the need for and an ability to engage in continuing professional development.
- i. An ability to use current techniques, skills, and tools necessary for computing practice.
- j. An ability to apply mathematical foundations, algorithmic principles and computer theory in modeling and design of computer-based systems.
- k. An ability to design and development principles in construction go software systems of varying complexity.
- l. An understanding the basics of computer hardware and how software interacts with computer hardware.

## **Accreditation**

The Computer Science Department is accredited by the Computing Accreditation Commission (CAC) of the Accreditation Broad for Engineering and Technology (ABET).

## **Admission Policies**

Actual admission into the Computer Science Undergraduate Program is coordinated through the NC A&T State University Admissions Office. Students must first apply to the University and support his/her application for admission with the following evidence of qualification in order to be considered for admission into the Computer Science Undergraduate Program:

- 1. English – 4 units emphasizing grammar, composition and literature
- 2. Science – 3 units (including at least one unit in a biological or life science, one unit in a physical science, and one unit in Chemistry. At least one unit should have a laboratory component.)
- 3. Mathematics - 4 units (including Algebra I, Algebra II, Geometry, and an additional unit beyond Algebra II - e.g., Trigonometry, Math Analysis, etc.).
- 4. Social Sciences - 2 units (including at least one unit in United States History)
- 5. Foreign Language 2 units are recommended in one foreign language.
- 6. Electives - 3 units (no more than 2 units in vocational subjects and 2 units in the disciplines of Music and Physical Education)

An applicant's high school record, class rank, and Scholastic Aptitude Test (SAT) or Admission College Test (ACT) scores are used in the admission decision process.

## **Policy for Changing Major to Computer Science**

If you are currently undecided or in another major at North Carolina A&T State University, and you wish to change your major to Computer Science, you must meet the following criteria.

- 1. Complete GEEN163 with a grade of C or better.
- 2. Complete MATH131 or MATH123 or COMP180 with a grade of C or better.
- 3. Must have a cumulative grade point average of 2.5 or better.

### **Policy on Undergraduate Students Receiving Credit by Examination**

The following is the procedure by which a student may receive credit by exam for undergraduate computer science courses.

1. A student wishing to receive credit by exam for any undergraduate course in computer science must be recommended by a faculty member who is very familiar with the course material.
2. To receive credit by exam for a course, the student must be registered for the course.
3. The student must take a comprehensive exam for the course and get 80% of the exam correct.
4. If a student passes the exam, the student will receive a grade of "P" for the course.
5. The student must take the exam no later than the first week of class.
6. A faculty member, who normally teaches the course, will provide and administer the exam.

### **Computer Science Department Policy on Cheating:**

Cheating covers any case in which a student has received unauthorized aid in his/her performance that contributes to a course grade or submits material contributing to a course grade with the intent to deceive the instructor or grader. If the unauthorized aid includes help from another student, then that student is considered to have cheated as well.

If a student cheats on a homework assignment, then he/she will receive a grade of zero (a grade of F) for that assignment as will anyone assisting him/her in an unauthorized way. If a student cheats on an exam or final, he/she will receive a failing grade for the class. All cases of cheating will be reported to the Director of Undergraduate Studies. When a student cheats for the second or more time in any Computer Science class, he/she will receive an F in the class in which the most recent case occurred and will be referred to the University authorities for disciplinary action.

### **Minimum Grade of "C" Policy**

Computer Science students must earn a grade of "C" or better in the following courses to graduate or to satisfy prerequisite requirements of subsequent courses.

GEEN163, GEEN165, COMP180, COMP280, COMP285, COMP360, COMP365, COMP370, COMP375, COMP385, COMP390, COMP450, COMP467, COMP476, COMP510, COMP596, MATH131

## Curriculum Guide for a Bachelors of Science in Computer Science

### Freshmen Year

Semester 1 (Fall) Courses		Semester 2 (Spring) Courses	
ENGL100 Ideas & Their Expressions I	3	ENGL101 Ideas & Their Expressions II	3
Approved Science Elective	4	COMP 180 Discrete Structures	3
GEEN 163 Intro. to Computer Programming	3	GEEN 165 Computer Programming Design	4
GEEN 111 College of Engineering Colloquium	1	COMP 121 Computer Science Freshmen Colloquium	1
MATH 131 Calculus I (Math, Logical & Analytical Reasoning)	4	MATH 132 Calculus II (Math, Logical & Analytical Reasoning)	4
Total	15	Total	15

### Sophomore Year

Semester 3 (Fall) Courses		Semester 4 (Spring) Courses	
Social/Behavior Sciences Elective	3	Humanities/Fine Arts Elective	3
Approved Science Elective	4	Approved Science Elective	4
SPCH 250 Speech Fundamentals	3	COMP 285 Analysis of Algorithms	3
MATH 431 Differential Equations	3	Approved Mathematics Elective[2]	3
COMP 280 Data Structures	3	COMP 467 Data Base Design	3
		COMP 200 Sophomore Colloquium	1
Total	16	Total	17

### Junior Year

Semester 5 (Fall) Courses		Semester 6 (Spring) Courses	
Social/ Behavior Sciences Elective	3	Approved Statistics Elective [1]	3
ENGL331 Writing Science & Technology (Writing in the Major)	3	COMP 322 Internet Systems	3
COMP 360 Programming Languages	3	COMP 365 Programming Meth. & Conc.	3
COMP 375 Computer Arch & Org	3	COMP 450 Operating Systems	3
Approved COMP Elective	3	Humanities/Fine Arts Elective	3
		COMP 300 Junior Colloquium	1
Total	15	Total	16

### Senior Year

Semester 7 (Fall) Courses		Semester 8 (Spring) Courses	
COMP 385 Theory of Computing	3	COMP 596 Senior Project II (Capstone)	3
COMP 510 Software Engineering	3	Approved COMP Elective	3
COMP 476 Networked Comp. Sys.	3	Approved COMP Elective	3
Free Elective	3	Business Elective	3
COMP390 Soc. Implications of Computing (Ethics)	3	Free Elective	3
Total	15	Total	15

**Program Total ----- 124**

[1] MATH 224 Probability & Statistics *or* INEN 370 Engineering Statistics *or* ECEN 356 Stochastic Processes and Random Variables

[2] MATH 440 Numerical Methods *or* MATH 450 Linear Algebra

## Curriculum Guide for a Bachelors of Science in Computer Science (For students needing Pre-Calculus)

### Freshmen Year

Semester 1 (Fall) Courses		Semester 2 (Spring) Courses	
ENGL100 Ideas & Their Expressions I	3	ENGL101 Ideas & Their Expressions II	3
Approved Science Elective	4	COMP 180 Discrete Structures	3
GEEN 163 Intro. to Computer Programming	3	GEEN 165 Computer Programming Design	4
GEEN 111 College of Engineering Colloquium	1	COMP 121 Computer Science Freshmen Colloquium	1
MATH 110 Pre-Calculus I	4	MATH 131 Calculus I	4
Total	15	Total	15

### Sophomore Year

Semester 3 (Fall) Courses		Semester 4 (Spring) Courses	
Social/Behavior Sciences Elective	3	Humanities/Fine Arts Elective	3
Approved Science Elective	4	Approved Science Elective	4
SPCH 250 Speech Fundamentals	3	COMP 285 Analysis of Algorithms	3
MATH 132 Calculus II	4	MATH 431 Differential Equations	3
COMP 280 Data Structures	3	COMP 467 Data Base Design	3
		COMP 200 Sophomore Colloquium	1
Total	17	Total	17

### Junior Year

Semester 5 (Fall) Courses		Semester 6 (Spring) Courses	
Approved Mathematics Elective[2]	3	Approved Statistics Elective [1]	3
ENGL331 Writing Science & Technology (Writing in the Major)	3	COMP 322 Internet Systems	3
COMP 360 Programming Languages	3	COMP 365 Programming Meth. & Conc.	3
COMP 375 Computer Arch & Org	3	COMP 450 Operating Systems	3
Approved COMP Elective	3	Humanities/Fine Arts Elective	3
		COMP 300 Junior Colloquium	1
Total	15	Total	16

### Senior Year

Semester 7 (Fall) Courses		Semester 8 (Spring) Courses	
COMP 385 Theory of Computing	3	COMP 596 Senior Project II (Capstone)	3
COMP 510 Software Engineering	3	Approved COMP Elective	3
COMP 476 Networked Comp. Sys.	3	Approved COMP Elective	3
Social/ Behavior Sciences Elective	3	Business Elective	3
COMP390 Soc. Implications of Computing (Ethics)	3	Free Elective	2
Total	15	Total	14

**Program Total ----- 124**

[1] MATH 224 Probability & Statistics *or* INEN 370 Engineering Statistics *or* ECEN 356 Stochastic Processes and Random Variables

[2] MATH 440 Numerical Methods *or* MATH 450 Linear Algebra

## Curriculum Guide for a Bachelors of Science in Computer Science with Concentration in Information Assurance

### Freshmen Year

Semester 1 (Fall) Courses		Semester 2 (Spring) Courses	
ENGL100 Ideas & Their Expressions I	3	ENGL101 Ideas & Their Expressions II	3
Approved Science Elective	4	COMP 180 Discrete Structures	3
GEEN 163 Intro. to Computer Programming	3	GEEN 165 Computer Programming Design	4
GEEN 111 College of Engineering Colloquium	1	COMP 121 Computer Science Freshmen Colloquium	1
MATH 131 Calculus I (Math, Logical & Analytical Reasoning)	4	MATH 132 Calculus II (Math, Logical & Analytical Reasoning)	4
Total	15	Total	15

### Sophomore Year

Semester 3 (Fall) Courses		Semester 4 (Spring) Courses	
Social/Behavior Sciences Elective	3	Humanities/Fine Arts Elective	3
Approved Science Elective	4	Approved Science Elective	4
SPCH 250 Speech Fundamentals	3	COMP 285 Analysis of Algorithms	3
MATH 431 Differential Equations	3	Approved Mathematics Elective[2]	3
COMP 280 Data Structures	3	COMP 467 Data Base Design	3
		COMP 200 Sophomore Colloquium	1
Total	16	Total	17

### Junior Year

Semester 5 (Fall) Courses		Semester 6 (Spring) Courses	
Social/ Behavior Sciences Elective	3	Approved Statistics Elective [1]	3
ENGL331 Writing Science & Technology (Writing in the Major)	3	COMP 322 Internet Systems	3
COMP 360 Programming Languages	3	COMP 365 Programming Meth. & Conc.	3
COMP 375 Computer Arch & Org	3	COMP 450 Operating Systems	3
<b>COMP 320 Fundamentals of Information Assurance</b>	3	Humanities/Fine Arts Elective	3
		COMP 300 Junior Colloquium	1
Total	15	Total	16

### Senior Year

Semester 7 (Fall) Courses		Semester 8 (Spring) Courses	
COMP 385 Theory of Computing	3	COMP 596 Senior Project II (Capstone)	3
COMP 510 Software Engineering	3	Approved COMP Elective	3
COMP 476 Networked Comp. Sys.	3	Business Elective	3
<b>Approved Information Assurance Elective[3]</b>	3	Free Elective	6
COMP390 Soc. Implications of Computing (Ethics)	3		
Total	15	Total	15

**Program Total ----- 124**

[1] MATH 224 Probability & Statistics *or* INEN 370 Engineering Statistics *or* ECEN 356 Stochastic Processes and Random Variables

[2] MATH 440 Numerical Methods *or* MATH 450 Linear Algebra

[3] COMP 321 Computer Systems Security *or* COMP 420 Applied Network Security *or* COMP 421 Security Management for Information Assurance



## Required Computer Science & Computer Programming Courses

GEEN111	College of Engineering Colloquium	1
GEEN 163	Introduction to Computer Programming	3
GEEN 165	Computer Programming Design	4
COMP 121	Computer Science Freshmen Colloquium	1
COMP200	Computer Science Sophomore Colloquium	1
COMP 280	Data Structures	3
COMP 285	Design and Analysis of Algorithms	3
COMP300	Computer Science Junior Colloquium	1
COMP 322	Internet Systems	3
COMP 360	Principles of Programming Languages	3
COMP 365	Programming Methodologies & Concepts	3
COMP 375	Computer Architecture and Organization	3
COMP 385	Theory of Computing	3
COMP 390	Social Implications of Computing	3
COMP 450	Operating Systems	3
COMP 467	Data Base Design	3
COMP 476	Networked Computer Systems	3
COMP 510	Software Engineering	3
COMP 596	Senior Project II	3
COMP	Computer Science Elective	9
<b>Total</b>		<b>59</b>

## Computer Science Electives

COMP 170	Introduction to Web Engineering
COMP 320	Fundamentals of Information Assurance
COMP 321	Computer System Security
COMP 323	Introduction to Health Care Information Systems
COMP 340	Game Intelligence
COMP 356	Computational Hip-Hop & Object-Oriented Design
COMP 363	Object Oriented Programming
COMP 368	Object Oriented Software Design
COMP 420	Applied Network Security
COMP 421	Security Management for Information Systems
COMP 440	Game Design
COMP 445	An Introduction to Artificial Intelligence
COMP 469	Introduction to Parallel Programming
COMP 500	Independent Study
COMP 511	Introduction to System Testing and Evaluation
COMP 553	Introduction to Computer Graphics
COMP 563	Introduction to Compiler Design
COMP 567	Introduction to Data Mining
COMP 590	Special Topics in Computer Science
COMP 595	Senior Project I

### Computer Science Electives Offered in other Departments

MIS 440	Management Information Systems
BUED 342	Business Programming
ECEN 427	Introduction to Microprocessors
INEN 415	Simulation of Production Systems
MATH 460	Numerical Analysis
MATH 465	Introduction to Scientific Computing

### Mathematics

COMP 180	Discrete Structures	3
MATH 131	Calculus I	4
MATH 132	Calculus II	4
MATH 431	Differential Equations	3
MATH 224	Statistics and Probability <i>or</i> INEN 270 Engineering Statistics	3
MATH 440	Numerical Methods <i>or</i> MATH 450 Linear Algebra	<u>3</u>

**Math total** **20**

### Science

**Take any one of the following groupings**

CHEM 106	Chemistry I with CHEM 116 lab	4
CHEM 107	Chemistry II with CHEM 117 lab	4

**And any one course from the list below**

PHYS 241	Physics I with PHYS 251 lab	4
BIOL 100	Biological Science	4
BIOL 101	Concepts of Biology	4
SLSC 338	Fundamentals of Soil Science	4

**Or**

PHYS 241	Physics I with PHYS 251 lab	4
PHYS 242	Physics II with PHYS 252 lab	4

**And any one course from the list below**

BIOL 100	Biological Science	4
CHEM 106	Chemistry I with CHEM 116 lab	4
SLSC 338	Fundamentals of Soil Science	4

**Science total** **12**

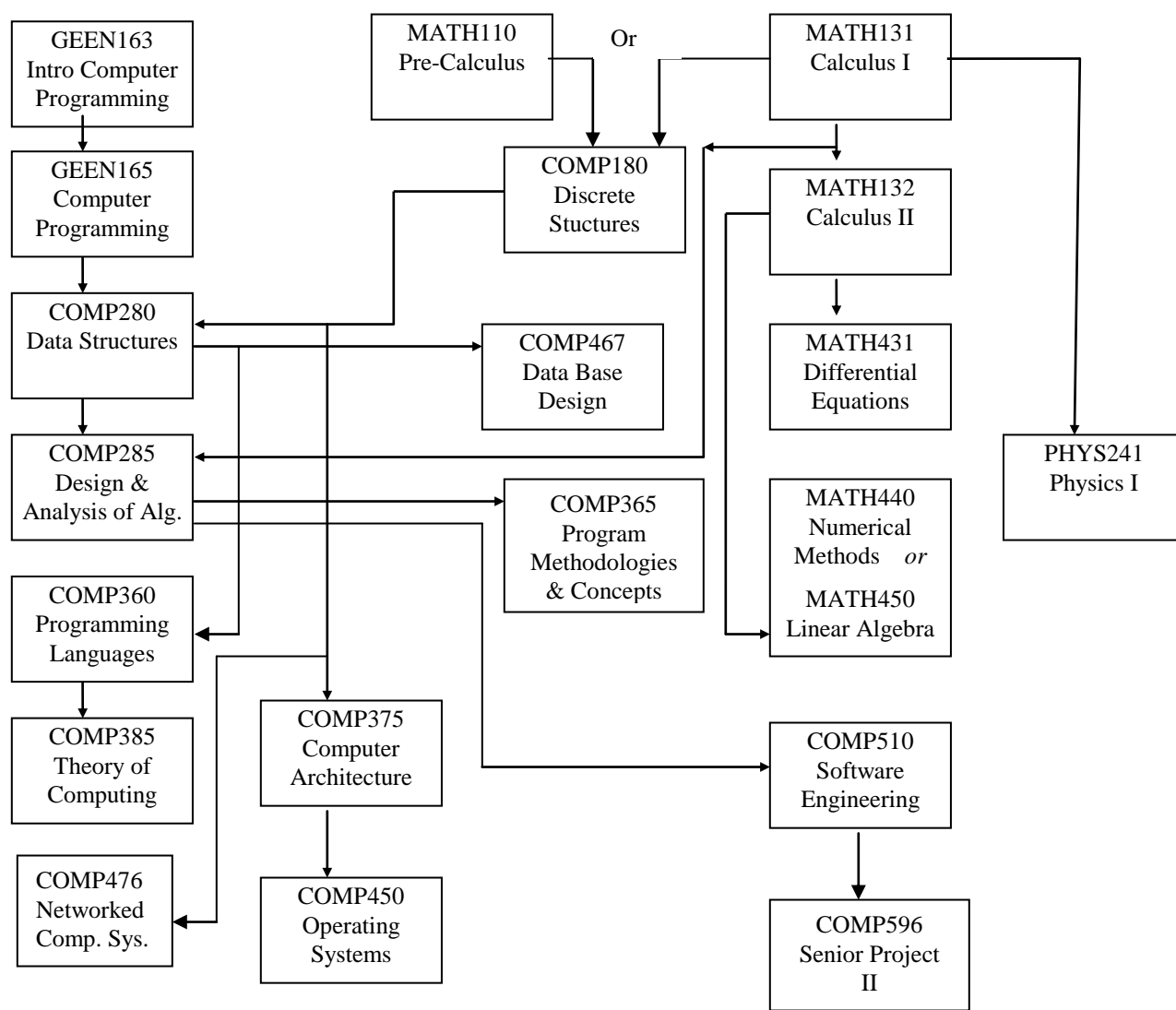
## General Education Requirements

ENGL100	Ideas & Their Expressions I	3
ENGL 101	Ideas & Their Expressions II	3
	Social/Behavior Sciences Elective	6
	Humanities/Fine Arts Elective	6
SPCH250	Speech Fundamentals	3
ENGL 331	Technical Writing	3
	Approved Business Electives	3
	Free Electives	6
<b>General Education total</b>		<b>33</b>

## Business & Economics Group Electives

MGMT 220	Business Environment
MIS 241	Introduction to Management Information Systems
MGMT 422	Management Concepts
MGMT 426	Human Behavior in Business
MKTG 430	Marketing
MGMT 481	Management Science
ECON 200	Principles of Economics (Micro)
ECON 201	Principles of Economics (Macro)

## Prerequisites for Computer Science Required Courses



## ***Prerequisites for Computer Science Elective Courses***

<u>Course</u>	<u>Prerequisite</u>
COMP 170 Introduction to Web Engineering	none
COMP 320 Fundamentals of Information Assurance	COMP280
COMP 321 Computer System Security	COMP285
COMP 323 Introduction to Health Care Information Systems	Junior Standing
COMP 340 Game Intelligence	COMP280
COMP 356 Computational Hip-Hop and OOD	GEEN163 or Instructor's Permission
COMP 363 Object Oriented Programming	COMP280
COMP 368 Object-Oriented Software Development	COMP280
COMP 420 Applied Network Security	COMP285
COMP 421 Security Management for Information Systems	COMP285
COMP 440 Game Design	COMP340
COMP 445 An Introduction to Artificial Intelligence	COMP285
COMP 469 Introduction to Parallel Programming	COMP450 or Instructor's Permission
COMP 500 Independent Study	Instructor's Permission
COMP 511 Introduction to System Testing and Evaluation	COMP510
COMP 553 Introduction to Computer Graphics	COMP285
COMP 563 Introduction to Compiler Design	COMP285 and COMP375
COMP 567 Introduction to Data Mining	COMP280 or Instructor's Permission
COMP 590 Special Topics in Computer Science	Instructor's Permission
COMP 595 Senior Project I	COMP285 & COMP510 (Corequisite)

## Course Descriptions

### **GEEN 111. College of Engineering Colloquium**

**Credit 1(1-0)**

This course provides the students with exposure to current issues in computer science. Colloquium speakers shall include visitors and faculty.

Prerequisite: Freshman standing. (F)

### **GEEN 160. Computer Program in C++ for Engineers**

**Credits 2(2-2)**

This is an introductory course in C++ computer programming for engineering students. Problem solving techniques and coding algorithms will be stressed. Students will write programs for such tasks as engineering decision-making and numerical computation. Material relevant to the Fundamentals of Engineering exam will be covered. (F;S;SS)

### **GEEN 163. Introduction to Computer Programming**

**Credits 3(3-2)**

This is an introductory course in computer programming. Problem solving techniques and writing algorithms will be stressed. Students will write programs for such tasks as engineering decision-making and numerical computation. Prerequisite: None (F;S;SS)

### **GEEN165. Computer Program Design**

**Credits 4(3-2)**

This is a second course in computer programming for students with an interest in computers. Students will learn to write programs in a high level programming language. Prerequisite GEEN163 (F;S;SS)

### **COMP 121. Computer Science Freshmen Colloquium**

**Credits 1(1-0)**

This course includes lectures, seminars and activities important to the retention and matriculation of computer science students. Topics covered include learning styles, group dynamics, computer science history, and career development. Students are also provided with group advisement regarding department, college, and university-level policies and procedures. Prerequisite: None (F;S;SS)

### **COMP 120. Computers and Their Use**

**Credits 3(2-2)**

This Course provides a survey of the basic principles of computer hardware, computer communications, application software, operating systems, security, impact on society, use in organizations and systems development. Principles of programming are introduced. Information is at a level for the students to become informed users. This course cannot be taken for credit by computer science majors. Prerequisite: None. (F;S;SS)

### **COMP 170. Introduction to Web Engineering**

**Credits 4(3-2)**

This course introduces basic web development using HTML and client-side and server-side scripting. Students also learn how to incorporate security features into web sites as well as how to access and manage online databases. This course also covers the role of the web in disseminating knowledge, community formation, training, collaboration, and other social activities. Prerequisite: None (F;S;SS)

**COMP 180 Discrete Structures****Credits 3(3-0)**

Students will be introduced to formal systems, including propositional and predicate logic, that can be used to reason about computer algorithms. Students will develop an understanding of how to read and construct valid proofs of the properties of algorithms. Important discrete data structures, such as sets, relations, discrete functions, graphs and trees, will be introduced. Prerequisite: MATH110 or MATH131 (F;S;SS)

**COMP 200. Computer Science Sophomore Colloquium****Credit 1(1-0)**

This course provides the students with exposure to current issues in computer science. Colloquium speakers shall include visitors and faculty. Prerequisite: Sophomore Standing (F;S;SS)

**COMP 280. Data Structures****Credits 3(3-1)**

This is the third course in the computer science sequence. It introduces abstractions (algorithm, data type, complexity) and programming tools (pointers, dynamic memory, and linked data lists, and graphs). It analyzes and implements techniques such as hashing, sorting, searching, and priority queues, to solve general problems. The emphasis of the course is on building modular programs that can be changed to use different data structures and algorithms. Prerequisites: GEEN 165 and (MATH 123 or COMP 180 or ECEN227). (F;S;SS)

**COMP 285. Design and Analysis of Computer Science****Credits 3(3-0)**

This course covers analysis of efficient algorithms for sorting, searching, dynamic structure manipulation, path finding, fast multiplication, and other problems. It introduces algorithmic techniques such as recursion, divide-and-conquer, and dynamic programming. It develops the following tools for algorithmic analysis: correctness proofs, algorithm synthesis, and discusses issues in non-computability. This course also overviews non-deterministic algorithms, and develops techniques to classify computationally hard problems. The concept of non-deterministic polynomial (NP)-completeness is introduced, and basic issues related to NP-completeness are discussed. Prerequisites: COMP 280, MATH 131. (F;S;SS)

**COMP 300 Computer Junior Colloquium****Credit 1(1-0)**

This course provides the students with exposure to current issues in computer science. Colloquium speakers shall include visitors and faculty. Prerequisite: Junior standing (F;S;SS)

**COMP 320. Fundamentals of Information Assurance****Credits 3(3-0)**

This course covers concepts in computer network and information security. Topics include: software strategies for exchanging secure data and encryption standards. Strategies for the physical protection of information assets are explored. Issues involving information security management within an enterprise are covered, including suitable organizational policy, plans, and implementation strategies. Ethical issues, such as monitoring employee computer use and proper limitations on the use of customer data, are also discussed. Prerequisite: COMP280 (F;S;SS)

**COMP 321. Computer System Security****Credits 3(3-0)**

This course introduces the principles of information systems security and examines security policies, models, mechanisms for secrecy, integrity, availability and access controls. Topics include common system vulnerabilities and countermeasures, data availability and usage control, authentication technologies, design secure systems, operating systems security, network security, programming language security, and distributed systems security. Prerequisite: COMP285 (F;S;SS)

**COMP 322. Internet Systems****Credits 3(3-0)**

This course addresses the structure and functionality of the Internet and software that exploits it. Topics include mark up languages, Web tools, static, dynamic and active web pages, multimedia in Web applications, communication protocols, client-server, computing, scripting, group and coordinating work at different sites, multi-agent systems that exploit the Internet, and architectures to exploit the distributed computational power offered by the Internet. Prerequisite: COMP 280 (F;S;SS)

**COMP 323. Introduction to Health Care Information Systems****Credits 3(3-0)**

This course introduces broad aspects of health care information systems. The goal is to prepare students with knowledge for effectively managing health care information systems. The main topics of this class include: types of health care information and data, regulations, standards, and laws of health care information, history of health care information systems, technologies in health care information systems, health care information systems standards, security in health care information systems, management of health care information systems. Prerequisite: Junior Standing (F;S;SS)

**COMP 340. Game Intelligence****Credits 3(3-0)**

This course provides an overview of concepts used in game intelligence. Topics will include intelligent game agents, game state representation, search, and machine learning. Prerequisite: COMP280 (F;S;SS)

**COMP 356. Computational Hip-Hop and Object-Oriented Design****Credits 3(3-0)**

This course introduces students to the fundamentals of the Unified Modeling Language (UML) from a Hip-Hop perspective. Students will learn how to use UML to reverse and forward engineer design artifacts for Hip-Hop music, and software applications. Prerequisite: GEEN163 or Instructor's Permission (F;S;SS)

**COMP 360. Programming Languages****Credits 3(3-0)**

This course focuses on formal specification of programming languages, including definition of syntax and semantics: simple statements including precedence, infixes, prefix, and postfix notations. It highlights global properties of algorithmic languages including sequence control, data structure implementation, scoping, storage management, grouping of statements, binding time, sub-routines, and tasks. Prerequisite: COMP 280 (F;S;SS)

**COMP 363. Object Oriented Programming****Credits 3(3-0)**

This is a course in object oriented program development. The main topics include encapsulation, polymorphism, inheritance, debugging and performance tuning. Prerequisites: COMP 280 (F;S)

**COMP 365. Programming Methodologies & Concepts****Credits 3(3-0)**

This course covers advanced programming techniques in order to enhance the student's knowledge and experience in programming. This course includes techniques dealing with advanced object oriented programming, human computer interaction, computer graphics and current programming trends. This course will also cover AI techniques such as search strategies and knowledge representation. Prerequisites: COMP285 (F;S;SS)

**COMP 368. Object-Oriented Software Development****Credits 3(3-0)**

This course studies object-oriented software development. Object-oriented modeling, software design by pattern, software design by generic component, software reuse and object-oriented application frameworks are introduced. Problems in large software systems are discussed, and students learn how to integrate



object-oriented language features into object-oriented software development. Prerequisite: COMP280 (F;S;SS)

**COMP 370. Introduction to Computer Architecture**

**Credits 3(3-0)**

This course teaches techniques for design and optimization of combinatorial logic circuits, flip-flops, counter, registers and arithmetic concepts necessary to understand computer logic. Additional topics include assembly language programming, interrupt handling, and data representation. Prerequisite: COMP 280 (F;S;SS)

**COMP 375. Computer Architecture and Organization**

**Credits 3(3-0)**

This course explores the design of computer systems and their architectures. Topics include central processing unit architecture, microcode, system interconnections, memory systems, input/output systems, interrupt handling, peripherals and communications networks. Prerequisites: COMP280 or ELEN327 (F;S)

**COMP 385. Theory of Computing**

**Credits 3(3-0)**

This course is the study of topics, which include theory of finite state machine and automata; regular expressions; Turing machines; grammars; parsing; language hierarchy; machine design and construction; computability; unsolvability; halting problem; computational complexity; and recursive functions. The course also discusses issues in equivalence of various computational models, minimization, and characterizations. Prerequisites: COMP 360. (F;S)

**COMP 390. Social Implications of Computing**

**Credits 3(3-0)**

This course examines the increasingly complex interaction between computer systems, our social fabric and ethics. Software and microprocessors control automobiles, banks, brokerage trading, aircraft, medical equipment, and just about every other device used in industrialized nations. Impacts of computerized systems upon personal privacy and citizen involvement in governance are examined in relation to the public policy questions of the day. The role and opportunity for historically under-represented groups will be explored. Interdisciplinary readings are stressed, along with required written and oral presentations and class debates. (F;S)

**COMP 397. Co-operative Industrial Experience I**

**Credits 3(3-0)**

This is a supervised learning experience in an approved private or government facility. The student must be employed full time for at least one semester and must prefer supervised work that will enhance his/her educational background in an area related to computer science. In addition to the supervisor's evaluation in the field, the student's performance will be evaluated by a departmental faculty committee, based upon the recommendation of the Director of the Co-operative Educational Program, reports, informal portfolios and forum and/or seminar presented by the student upon his/her return to the university. Prerequisite: Permission of Advisor (F;S)

**COMP 420. Applied Network Security**

**Credits 3(3-0)**

This course covers network security concepts and various network security practices and solutions. Topics include cryptography, Public Key Infrastructure (PKI), taxonomy of various attack methods, firewalls, intrusion detection and prevention, Internet Protocol (IP) security, and web security. Prerequisite: COMP285 (F;S;SS)

**COMP 421. Security Management for Information Systems**

**Credits 3(3-0)**

This course covers in-depth examination of topics in the management of information systems security including access control systems & methodology, risk management, business continuity and disaster recovery planning, legal and ethical issues in information system security, computer operations security, physical security, and information security maintenance. Prerequisite: COMP285 (F;S;SS)

**COMP 440. Game Design**

**Credits 3(3-0)**

This course will provide an introduction to current techniques used in game design. Topics will include game engines, game mechanics, autonomous game agents, and multi-player games. Prerequisite: COMP340 (F;S;SS)

**COMP 445. An Introduction to Artificial Intelligence**

**Credits 3(3-0)**

This course is an introduction to the theory of artificial intelligence and a survey of artificial intelligence application areas. It covers the foundational concepts related to knowledge representation and search strategies. An artificial intelligence language is presented to programming experience in implementing basic artificial intelligence concepts. Some of the applications areas that are discussed include: game playing, expert systems, theorem proving natural language understanding, machine learning, planning, and robotics. Prerequisites: COMP 285, MATH 223 (DEMAND)

**COMP 450. Operating Systems**

**Credits 3(3-0)**

This is an introduction to the theory and practice of operating system design and implementation. Algorithmic techniques are presented for implementing process management, storage management, processor management, file systems, security, distributed systems, performance evaluation, and real time systems. Prerequisite: COMP 375 or Corequisite: COMP 375. (F;S)

**COMP 467. Database Design**

**Credits 3(3-0)**

This course focuses on logical and physical organizations of sets of related data. It covers issues in file structures as well as file and database management systems. It explores relational models, hierarchical models, directed graph models, data definition and manipulation languages, and relational calculus. Application oriented projects are required. Prerequisite: COMP 280. (F;S)

**COMP 476. Networked Computer Systems****Credits 3(3-0)**

This course presents an overview of the technology, architecture and software used by systems of network-connected computers. The course will cover data transmission, local area network architecture, network protocols, internetworking, security, and World Wide Web technology. Students will write programs that run concurrently on multiple computers.

Prerequisite: COMP 280 or ECEN327 (F;S)

**COMP 469. Introduction to Parallel Programming****Credits 3(3-0)**

This course provides an introduction to parallel programming and problem solving. Topics include parallel programming design, parallel programming models, programming on multicore architectures, parallel computational thinking, and introduction to performance analysis of parallel algorithms.

Prerequisite: COMP 450 or Consent of Instructor (F;S;SS)

**COMP 500. Independent Study****Credits 3(3-0)**

This course can be used for study of advanced topics in computer science pertinent to the student's interest under supervision of a faculty member. Prerequisite: Permission of Instructor (F;S;SS)

**COMP 510. Software Engineering****Credits 3(3-0)**

This course is an introduction to the principles underlying software specification, implementation, validation, and management. It addresses applications of software engineering concepts to large software systems. Team effort is emphasized throughout the course. Prerequisite: COMP285 (F;S)

**COMP 511. Introduction to System Testing and Evaluation****Credits 3(3-0)**

This course is an introduction to methods, techniques and procedures for system testing and evaluation. The main topics include reliability measurement, testing small and large systems, black box software testing, white box software testing, testing of concurrent and real-time systems, client-server testing, test case design methods, and automated testing tools. Prerequisite: COMP 510 (F;S;SS)

**COMP 553. Introduction to Computer Graphics****Credits 3(3-0)**

This is an introductory course in fundamental principles and method in the design, use, and understanding of computer graphic systems. Topics include coordinate representations, graphics in functions, graphics algorithms and software standards. It also introduces basic two-dimensional transformations, reflection, shear; windowing concepts, clipping algorithms, window-to-viewpoint transformations, segment concept and interactive picture-construction techniques. Prerequisite: COMP 285 (F;S;SS)

**COMP 563. Introduction to Compiler Design****Credits 3(3-0)**

This course gives an introduction to the theoretical and practical aspect of constructing compilers for computer programming languages. The course covers principles, models and techniques used in the design and implementation of compilers, interpreters, and assemblers. Each student will develop and implement a compiler. Prerequisite: COMP 285 and COMP 375 (F;S;SS)

**COMP 567. Introduction to Data Mining****Credits 3(3-0)**

This course introduces the modern computer application of data mining. The theory of data mining is presented as well as applications of its principles in industry. This course covers the basics of techniques and applications such as cluster detection, market basket analysis, decision tree derivation, genetic algorithms, artificial neural networks, memory-based reasoning, and data warehouses. Students learn a

variety of algorithms for discovering meaningful patterns and rules in large quantities of data.  
Prerequisite: COMP280 (F;S;SS)

**COMP 590. Special Topics in Computer Science**

**Credits 3(3-0)**

This course permits the exploration of advanced topics pertinent to student's program of study in a seminar setting. (F;S)

**COMP 595. Senior Project I**

**Credits 3(3-0)**

This course is the first course in a two-semester sequence, which allows students the opportunity to design and implement a software project from start to finish. Projects started in this course will be completed in COMP596, giving the student the opportunity to work on a project of significant size. Students taking this course must take COMP596. Prerequisite: COMP285      Corequisite: COMP510 (F;S;SS)

**COMP596. Senior Project II**

**Credits 3(3-0)**

This course allows students the opportunity to design and implement a software project from start to finish. Projects started in COMP595 must be completed in this course for students working on a year-long project. Student choosing to do a semester project must start and complete the project in this course. This course gives the student the opportunity to work on a software project of significant size.

Prerequisite: COMP510 (F;S;SS)

## Computer Science Department

Chairperson - Dr. Gerry Dozier (508 McNair Hall)

Undergraduate Director - Shearon Brown (504 McNair Hall)

Graduate Director - Dr. Anna Yu (501 McNair Hall)

### Faculty Advisors for Undergraduate Students

#### **Freshman**

Prof. S. Brown      504 McNair Hall

#### **Honors Students**

Dr. Dozier      508 McNair Hall

#### **Upperclassmen**

*The corresponding faculty member will advise students whose last name starts within the specified alphabetical range.*

<b>Last name alphabet range</b>	<b>Advisor</b>	<b>Advisor's Office</b>
A-Bo	Prof. Effort	302 Cherry Hall
Br-C	Dr. Kim	506 McNair Hall
D-Go	Dr. Yuan	502 McNair Hall
Gr-Ha	Dr. Esterline	331-A McNair Hall
He-J	Prof. Bullock	505 McNair Hall
K-L	Prof. Carr	330 McNair Hall
Ma-Mc	Dr. Bryant	303 Cherry Hall
Me-Sh	Dr. Williams	503 McNair Hall
Si-Wa	Dr. Xu	325 McNair Hall
We-Z	Dr. Yu	501 McNair Hall