

COLLEGE OF INFORMATION TECHNOLOGY

Dean: Mirsad Hadzikadic; *Associate Dean:* Richard A. Lejk; *Executive in Residence:* Olin Broadway

BACKGROUND AND MISSION

The University of North Carolina at Charlotte's College of Information Technology (IT) is part of a dynamic and exciting, educational and research institution that combines the knowledge and expertise of multidisciplinary faculty, industry professionals, and students. The College of IT was formed in 2000, with the mission of educating information specialists, conducting leading-edge research, and partnering with area businesses of great importance to the Charlotte community and the University.

With educational programs rooted in a strong foundation of research, the College of IT combines the talents of on- and off-campus partners in achieving its mission. Academic programs include Bachelor's, Master's, and Ph.D. degree programs in computer science, software and information systems, and information technology. Committed to the concept of life-long learning, the College also offers undergraduate and graduate certificate programs.

A key component of all College of IT academic programs is the team interaction between students, faculty, and community partners. Through their involvement in real-world projects, students apply what they learn, thus, giving them practical experience as they help businesses solve information technology challenges.

The three primary missions of the College of IT are:

- to educate and prepare the information technology professionals of tomorrow;
- to conduct leading-edge research in enterprise information systems; and,
- to partner with area industry to develop information technology solutions.

Computer Science Program. The Computer Science Department offers a wide variety of programs to match the diverse requirements of employers. The computer science major may pursue either a Bachelor of Science or a Bachelor of Arts degree.

The Bachelor of Science program offers the student two very different concentrations: computer science or computer engineering. The computer science option is centered on software development. Theoretically based, this program prepares students to continue their education in master's or doctoral programs, or to enter the business world as a computer scientist. The computer engineering option prepares the graduate to enter the computer industry either as a computer hardware design engineer or as a computer scientist with a heavy dose of mathematics, the physical sciences, and electrical engineering.

The Bachelor of Arts option is in computer science. As in the Bachelor of Science program, the computer science concentration prepares the student to enter the business world as a computer scientist. The emphasis in this program

is less theoretical and mathematical, and more on the applied side.

The curriculum provides flexibility for the student to tailor a program to meet her or his needs and objectives. For the computer science option in the Bachelor of Science or Bachelor of Arts degrees, the student must select a minimum of 15 hours outside of computer science in which to study. This "minor-like" program allows the student to select from the full spectrum of University programs and majors, including the University Honors Program.

Software and Information Systems Program. The Department of Software and Information Systems is primarily focused on the study of technologies and methodologies for information system architecture, design, implementation, integration, and management. An illustrative list of questions/issues of interests includes:

- Analysis and design methodologies of component-based software systems
- Integration and interoperation of information systems
- Theories and methodologies of software development
- Information system security architecture and protocols
- Design of efficient heterogeneous computer networks
- Architectures for distributed systems
- Collaborative system technology and design
- Human/computer interaction
- Design of information systems based on ubiquitous/pervasive computing
- Software engineering
- Quality, testing, and simulation of software designs
- Social, ethical, and policy issues related to IT
- Information system architectures for electronic enterprise
- Technologies for information system privacy

The Department of Software and Information Systems offers a Bachelor of Arts program that focuses on the applications of information technology. Software is the driving force of the emerging information economy. The Department of Software and Information Systems focuses on issues related to developing software, information systems, and their interactions with people. This degree program is committed to best prepare students to match the diverse requirements of employers.

SPECIAL COLLEGE PROGRAMS

Cooperative Education Program. Students in the College of Information Technology may obtain practical work experience while pursuing their degree by participating in cooperative education, whereby a student alternates semesters of academic study with semesters of work experience in industry. The work experience is under the direction of the student's department and is closely related to his or her field of study.

To be eligible for the Co-op program, students in the College of Information Technology must have completed at

least 24 credit hours at UNC Charlotte, including a number of specified courses, with a minimum GPA of 2.50. A transfer student is expected to have completed 12 hours at UNC Charlotte, with those same specified courses.

For an undergraduate to be officially designated as a Co-op student, he or she must participate in at least two semesters of work experience. Consequently, participation in Co-op Education may mean that the student will take five years to complete the programs at UNC Charlotte.

Students interested in learning more about the advantages and opportunities of participating in this program should contact the University Career Center.

Internships. A number of opportunities for internships exist for students in the College. These internships may be with or without pay and with or without academic credit. Students interested in learning more about these opportunities should consult with their advisor and with the College of Information Technology program coordinator in the University Career Center.

Internships, or *49erships*, involve paid or unpaid work in a career-related position for professional experience. A minimum of 80 work hours for one semester is required to complete the program. Fall and Spring 49erships are part-time. Summer 49erships may be full- or part-time. Full-time students who are in good University standing, have completed their freshman year, and have a 2.0 minimum cumulative GPA are eligible. It does not offer academic credit, but it is noted on the student's transcript; students pay a participation fee. Approval for enrollment must be arranged before the student begins his work experience. Students may begin this program during their sophomore year; transfer students must complete one semester at UNC Charlotte before making application for the program. For more information, contact the University Career Center.

Department of Computer Science

Chairperson: Hodges; *Associate Chairperson:* Allen; *Director of Graduate Studies:* Chen; *Director of Freshman Programs:* Frazier; *Bank of America Endowed Chair:* Ribarsky; *Professors:* Mays, Michalewicz, Ras, Wilkinson, Xiao; *Professors Emeriti:* Epstein, Revesz, Schell; *Associate Professors:* Dahlberg, Lejk, Mostafavi, Subramanian; *Associate Professor Emeritus:* Razavi; *Assistant Professors:* Barnes, Fan, Najarian, Shin, Wang, Wu, Yang; *Senior Lecturer:* Cassidy; *Lecturers:* Goodrum, Ilson, Lehman, Scott; *Visiting Assistant Professor:* Wartell; *Adjunct Professor:* Wiczorkowski

Computer Science is the term applied to areas of study centering on the organizational and structural properties of systems, arrays of symbols, and mechanical languages which find their application in the processing and communication of information. The computer scientist's concerns are:

- the organization and interaction of equipment constituting an information processing system
- the development of software systems to control and communicate with equipment

- the derivation and study of procedures and basic theories for the specification of processes, and
- the application of systems, software, procedures, and theories of computer science to other disciplines

The Department of Computer Science offers programs leading to four degrees: Bachelor of Arts, Bachelor of Science, Master of Science, and Ph.D. in Information Technology. (See the *Graduate Catalog* for information on the M.S. and Ph.D. degrees). Students are prepared for their profession through a comprehensive program of courses, aided by some of the latest computer equipment available.

Cooperative Education in Computer Science. By participating in the Cooperative Education program, students in computer science may pursue their education along with alternating work experiences so that they may be better prepared to enter their chosen professional career. Interested students should contact the University Career Center for more information.

BACHELOR OF ARTS: COMPUTER SCIENCE

The *Computer Science Concentration* consists of 45 hours in computer science, and 15 hours in mathematics. Courses included are: ITCS 1214, 1215, 2163, 2214, 2215, 3102, 3155, 3160, 3166, 3650, 3651, 3651, 3688, and nine semester hours of approved ITCS or IT IS courses numbered 3000 or above; MATH 1120, 1165, 2164, STAT 1220, 1223; or MATH 1241, 1242, 1165, 2164, STAT 2122.

A component of related work must be included, consisting of 15 semester hours, consisting either of a prescribed set of courses from the College of Business and one 3000-level course from a restricted set of choices, 6 hours at the 3000-level or above, plus an additional 9 hours of approved non-computer-related courses, forming an integrated program of secondary strength, or nine semester hours of approved mathematics courses at the 3000 level or above. If the latter option is selected, six hours of additional electives must be selected.

BACHELOR OF SCIENCE: COMPUTER SCIENCE

The *Computer Science Concentration* consists of 51 hours of computer science and 15 hours in mathematics. Courses included are: ITCS 1214, 1215, 2181, 2214, 2215, 3102, 3143, 3155, 3160, 3166, 3182, 3650, 3651, 3688, and nine semester hours of approved ITCS or ITIS courses numbered 3000 or above; MATH 1241, 1242, 1165, 2164, STAT 2122.

A component of related work must be included, consisting of 15 semester hours, consisting either of a prescribed set of courses from the College of Business and one 3000-level course from a restricted set of choices, 6 hours at the 3000-level or above, plus an additional 9 hours of approved non-computer-related courses, forming an integrated program of secondary strength, or nine semester hours of approved mathematics courses at the 3000 level or above. If the latter option is selected, six hours of additional electives must be selected.

BACHELOR OF SCIENCE: COMPUTER SCIENCE, COMPUTER ENGINEERING CONCENTRATION

The *Computer Engineering Concentration* consists of 39 hours of computer science and 18 hours of mathematics. These include: ITCS 1214, 1215, 2181, 2214, 2215, 3102, 3143, 3155, 3182, 3183, 3681, 3682, 3688. MATH 1241, 1242, 1165, 2164, 2171, STAT 2122. Technical Electives: Twelve hours of ITCS/ITIS and ECGR courses that must be approved by the Department.

Students must also complete PHYS 2101, 2101L, 2102, 2102L, and 3141, and CHEM 1251 and 1251L. A component of related work must include 11 hours of electrical and computer engineering courses: ECGR 2111, 2112, 2155, 2156, and 3131. ECON 2101 must also be taken.

Information Science Minor

Requirements for the minor in Information Science include completion of 21 hours of computer science: ITCS 1214, 1215, 2214, 3112, 3143, 3155 and 3160, plus MATH 1165.

Computer Science Minor

Requirements for the minor in Computer Science include completion of 21 hours of computer science: ITCS 1214, 1215, 2214, 2215, 3155, 3160, and 3688, plus MATH 1165.

Certificate Program in Computer Programming

The Department of Computer Science offers a certificate in Computer Programming. A certificate will be awarded by the Department of Computer Science to post-baccalaureate students (students having earned a bachelor's degree in any field, with one semester of calculus), who have completed the course requirements listed below:

ITCS	1214	Introduction to Computing I
ITCS	1215	Introduction to Computing II
ITCS	2214	Data Structures
ITCS	2215	Design and Analysis of Algorithms
ITCS	3112	Design and Implementation of Object-Oriented Systems
ITCS	3155	Software Engineering
ITCS	3160	Data Base Design and Implementation or
ITCS	3145	Introduction to Parallel Computing
MATH	1165	Introduction to Discrete Structures

Certificate Program in Computer Architecture

The Department of Computer Science offers a certificate in Computer Programming. A certificate will be awarded by the Department of Computer Science to post-baccalaureate students (students having earned a bachelor's degree in any field, with one semester or calculus), who have completed the course requirements listed below:

ITCS	1214	Introduction to Computing I
ITCS	1215	Introduction to Computing II
ITCS	2181	Computer Logic and Design
ITCS	3145	Introduction to Parallel Computing
ITCS	3182	Computer Organization and Architecture
ITCS	3183	Hardware Systems Design
ITCS	3143	Operating Systems
ITCS	4181	Microcomputer Interfacing

CURRICULUM OUTLINE: B.A. DEGREE IN COMPUTER SCIENCE

Freshman Year

Fall	Spring
ITCS 1214 3	ITCS 1215 3
MATH 1120* 3	MATH 1165* 3
ENGL 1101 3	STAT 1220* 3
SocSci 3	Science 3
LBST 110x 3	ENGL 1102 3
15	15

Sophomore Year

Fall	Spring
ITCS 2214 3	ITCS 2215 3
ITCS 2163 3	COMM 2105 3
STAT 1223* 3	MATH 2164* 3
ENGL 2116 3	LBST 2102 3
LBST 2101 3	LBST 221x 3
15	15

Junior Year

Fall	Spring
ITCS 3102 3	ITCS 3155 3
ITCS/ITIS Elect 3	ITCS 3160 3
Science 4	ITCS 3166 3
Related Work 3	Related Work 6
13	15

Senior Year

Fall	Spring
ITCS 3650 3	ITCS 3651 3
ITCS 3688 3	ITCS/ITIS Elective 3
ITCS/ITIS Elect 3	Electives 8
Related Work 3	Related Work 3
Elective 3	17
15	

Total Hours 120

**A mathematics option consisting of MATH 1241, 1242, 1165, and 2164, and STAT 2122 may be selected as an alternate to the math courses listed.*

CURRICULUM OUTLINE: B.S. DEGREE IN COMPUTER SCIENCE

Freshman Year

Fall	Spring
ITCS 1214 3	ITCS 1215 3
MATH 1241* 3	MATH 1165 3
ENGL 1101 3	MATH 1242 3
SocSci 3	ENGL 1102 3
LBST 110x 3	Science 4
15	16

Sophomore Year

Fall	Spring
ITCS 2181 3	ITCS 2215 3
ITCS 2214 3	MATH 2164 3
STAT 2122 3	LBST 2102 3
LBST 2101 3	Science 3
ENGL 2116 3	Related Work 3
15	15

Junior Year

Fall	Spring
ITCS 3102 3	ITCS 3688 3

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ITCS 3182	3	ITCS 3155	3
ITCS/ITIS Elective	3	ITCS/ITIS Elective	3
Related Work	<u>3</u>	Related Work	3
	12	LBST 221x	<u>3</u>
			15

Senior Year

	Fall		Spring
ITCS 3650	3	ITCS 3651	3
ITCS 3160	3	ITCS 3143	3
ITCS/ITIS Elective	3	ITCS 3166	3
Related Work	3	Related Work	3
Electives	<u>3</u>	Electives	
	17		15

Total Hours 120

*A mathematics option consisting of MATH 1241, 1242, 1165, and 2164, and STAT 2122 may be selected as an alternate to the math courses listed.

CURRICULUM OUTLINE: B.S. DEGREE, COMPUTER ENGINEERING CONCENTRATION

Freshman Year

	Fall		Spring
ITCS 1214	3	ITCS 1215	3
MATH 1241	3	MATH 1165	3
CHEM 1251	3	MATH 1242	3
CHEM 1251L	1	PHYS 2101L	3
ENGL 1101	3	PHYS 2101L	1
LBST 110x	<u>3</u>	ENGL 1102	<u>3</u>
	16		16

Sophomore Year

	Fall		Spring
ITCS 2181	3	ITCS 2215	3
ITCS 2214	3	ECGR 2111	3
ENGL 2116	3	ECGR 2155	1
LBST 2101	3	MATH 2164	3
PHYS 2102	3	MATH 2171	3
PHYS 2102L	<u>1</u>	LBST 2102	<u>3</u>
	16		16

Junior Year

	Fall		Spring
ITCS 3182	3	ITCS 3102	3
ECON 2101	3	ITCS 3155	3
ECGR 2112	3	ITCS 3688	3
ECGR 2156	1	ECGR 3131	3
PHYS 3141	3	LBST 221x	<u>3</u>
STAT 2122	<u>3</u>		15
	16		

Senior Year

	Fall		Spring
ITCS 3183	3	ITCS 3143	3
ITCS 3681	3	ITCS 3682	3
Tech Electives	6	Tech Electives	<u>6</u>
Free Electives	<u>1</u>		12
	13		

Total Hours 120

**EARLY-ENTRY PROGRAM: the Master of Science in
Computer Science**

1. A student may submit an application after completion of at least 75 undergraduate hours. A student may not be admitted into the program until completion of at least 90 undergraduate hours.
2. An overall GPA of 3.5 or better is required for early-entry into the graduate program.
3. Student must submit satisfactory scores on the aptitude portion of the GRE tests.

Note: Up to 12 hours may be counted toward both BS/BA and MS degrees in Computer Science.

Department of Software and Information Systems

Chairperson: Bei-Tseng (Bill) Chu; *Graduate Coordinator:* Tolone; *Director of Undergraduate Studies:* Long; *Professors:* Chu, Zheng; *Associate Professor:* Tolone; *Assistant Professors:* Ahn, Kang, Lee, Liu, Raja, Wang, Wilson; *Lecturer:* Long; *Adjunct Professors:* Foley, Inskeep, Kitrick, Williams; *Adjunct Lecturers:* Callahan, He, Jancula

The Bachelor of Arts in Software and Information Systems is designed for students interested in pursuing a career in Information Technology with a focus on developing large-scale information systems. This degree will also well prepare students to pursue graduate studies in Information Technology and related application areas. The focus of this program includes:

- Network-based Application Development
- Software Engineering (design, integration, testing and assurance)
- e-Business Technologies
- Information Security and Privacy
- Design and Implementation of Information Environments

The Department of Software and Information Systems offers both undergraduate and graduate programs. The undergraduate program leads to either (1) a Bachelor of Arts in Software and Information Systems or (2) a minor in Software and Information Systems. The graduate program leads to a Master of Science in Information Technology (see the *Graduate Catalog* for information on the M.S. degree). In addition, graduate certificate programs in either (1) Information Security and Privacy or (2) Information Technology Management are available. To assist them in their studies, students have access to advanced computer labs and software where they can practice and experiment in controlled environments. Furthermore, the Department maintains a high degree of interaction with working industry professionals who provide real-world expertise and experience.

Cooperative Education in Software and Information Systems. By participating in the Cooperative Education program, students in the department may pursue their education along with alternating work experiences so that they may be better prepared to enter their chosen

professional career. Interested students should contact the University Career Center for more information.

BACHELOR OF ARTS: SOFTWARE AND INFORMATION SYSTEMS

This program requires 120 credit hours. In addition to the general education requirements for the University, the BA degree requires 45 hours of major courses: ITCS 1214, 1215, 2214, 2215, 3143, 3160, 3166, and 3688; ITIS 2300, 3200, 3300, 3310, 3320, 3650, and 3651; plus six hours of approved ITCS or ITIS courses numbered 3000 or above. 15 hours in mathematics in one of the following mathematics options are also required:

- MATH 1120, 1165, 2164 and STAT 1220, 1223
- MATH 1165, 1241, 1242, 2164, and STAT 2122

Finally, 15 semester hours of courses that form a coherent area of study related to developing applications of information systems are required. Selected in consultation with the students' advisors, these courses permit each student to tailor the degree to more closely match their individual interests.

CURRICULUM OUTLINE: B.A. DEGREE, SOFTWARE AND INFORMATION SYSTEMS (SUGGESTED)

Freshman Year

Fall		Spring	
ITCS 1214	3	ITCS 1215	3
MATH 1120*	3	ENGL 1102	3
ENGL 1101	3	MATH 1165*	3
Science	4	STAT 1220*	3
LBST 110x	<u>3</u>	Science	<u>4</u>
	16		16

Sophomore Year

Fall		Spring	
ITCS 2300	3	LBST 2101	3
ITCS 2214	3	Soc. Sci.	3
STAT 1223*	3	ITCS 2215	3
ENGL 2116	3	Related work	3
MATH 2164*	<u>3</u>	COMM 2105	<u>3</u>
	15		15

Junior Year

Fall		Spring	
ITIS 3300	3	ITCS 3160	3
ITCS 3166	3	Related work	3
ITCS 3688	3	Related work	3
Related work	3	ITIS/ITCS Elective	3
LBST 2102	<u>3</u>	ITCS 3310	<u>3</u>
	15		15

Senior Year

Fall		Spring	
ITIS 3320	3	ITCS 3143	3
ITIS 3650	3	ITIS 3651	3
ITIS 3200	3	LBST 221x	3
Related Work	3	ITIS/ITCS Elective	3
Elective	<u>3</u>	Elective	<u>1</u>
	15		13

Total Hours 120

**A mathematics option consisting of MATH 1165, 1241, 1242, 2164, and STAT 2122 may be selected as an alternate to the math courses listed.*

SOFTWARE AND INFORMATION SYSTEMS MINOR

This program is designed to provide students with the Information Technology knowledge necessary for today's information-based society. Students will not only gain hands-on knowledge of how to use the Internet to develop effective and easy-to-use applications but also will understand critical issues in designing information systems such as requirements development, integration, security and privacy, legal and policy considerations, and project management.

Program requirements:

The minor requires 18 credit hours. The following courses (9 credit hours) are required:

- ITIC 1214 – Introduction to Computer Science I
- ITIS 2300 – Introduction to Web-Based Application Development
- ITIS 3132 – Information Systems

Students should select three of the following courses (9 credit hours):

- ITCS 1215 – Introduction to Computer Science II
- ITIS 3130 – Human and Computer Interfaces
- ITIS 3131 – Human and Computer Information Processing
- ITIS 3200 – Introduction to Information Security and Privacy
- ITCS 3160 – Data Base Design and Implementation**
- ITCS 3688 – Computers and their Impact on Society***

***If this course is to be selected, the student must also select ITCS 1215.*

****This course meets the General Education Requirements for written and oral communications.*