

College of Computer and Information Science

www.ccs.neu.edu/undergraduate

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The invention of powerful computers and the development of complex software programs have fundamentally transformed the way people work and live. Computers are now essential tools in business, industry, science, medicine, and human services. Computers also enhance the efforts of individuals and volunteer groups to meet their goals. In addition, the most sophisticated work in music, film, and video often makes use of computer technology. The College of Computer and Information Science believes that computing is one of the most exciting fields of study and that its applications are limitless.

The college offers undergraduate degree programs in computer science (BS and BA) and information science (BS), and four dual majors with biology, cognitive psychology, mathematics, and physics, as well as a dual major in computer science and information science. The BS in computer science emphasizes strong technical competence in computer science, mathematics, science, and electrical engineering while the BA in computer science combines computer science with a broad-based liberal arts education. The BS in information science integrates studies in computer science, information science, business, psychology, and social science. Each of the dual majors offers the opportunity for intense study in two disciplines. The BS in computer science follows the ACM-IEEE Curriculum 2001 recommendations and is accredited by the Computing Accreditation Commission of ABET.

Academic Progression Standards

The following are the minimum requirements for freshmen to achieve sophomore status.

- At least 25 SHs of credit
- A minimum overall GPA of 1.800
- A minimum computer science GPA of 1.800
- Successful completion of the following required courses:
 - CS U211 and CS U200 – each with a grade of at least C–
 - ENG U111 or equivalent – ENG U102
 - An arts and sciences core course

The minimum overall grade-point averages required for students to advance to the next rank and to graduate are:

Middler	2.000
Junior	2.000
Senior	2.000
To graduate	2.000

In addition, students must achieve a minimum overall GPA of 2.000 and a minimum overall GPA in CS/IS courses of 2.000 for graduation. For additional information, consult the *College of Computer and Information Science Undergraduate Student Guidebook*.

Computer Science

Computer science involves the application of theoretical concepts in the context of software development to the solution of problems that arise in almost every human endeavor. Computer science as a discipline draws its inspiration from mathematics, logic, science, and engineering. From these roots, computer science has fashioned paradigms for program structures, algorithms, data representations, efficient use of computational resources, robustness and security, and communication within computers and across networks. The ability to frame problems, select computational models, design program structures, and develop efficient algorithms is as important in computer science as software implementation skill. Computer science is concerned with bringing together all of the intellectual resources needed to enable the rapid and effective development of software to meet the needs of business, research, and end users.

The goal of the undergraduate program in computer science is to teach students the conceptual and practical skills that will enable them to contribute to the development of computational principles and to play a productive role in the software community. To that end, the undergraduate program focuses on the fundamentals of program design including object-oriented design, software development, computer organization, systems and networks, theory of computation, principles of languages, and advanced algorithms and data. The program also offers a variety of electives at the upper undergraduate and beginning graduate levels ranging from more theoretical courses to those that focus on important applications.

College of Computer and Information Science Approved Courses: Diversity

Each College of Computer and Information Science degree program references the following list of approved diversity courses:

AFR U109	Foundations of Black Culture 1	4 SH	ASL U150	Deaf People in Society	4 SH
AFR U128	Music of Africa	4 SH	ASL U350	Deaf History and Culture	4 SH
AFR U131	Music of Latin America and the Caribbean	4 SH	CIN U240	Latin American Film	4 SH
AFR U140	Introduction to African-American History	4 SH	CIN U255	Chinese Film: Gender and Ethnicity	4 SH
AFR U180	African History	4 SH	CIN U260	Japanese Film	4 SH
AFR U185	Gender in the African Diaspora	4 SH	CIN U265	Spanish Civil War on Film	4 SH
AFR U212	History of Race	4 SH	CIN U270	Modern German Film and Literature	4 SH
AFR U261	The Modern Caribbean	4 SH	CIN U280	French Film and Culture	4 SH
AFR U270	Economic Status of Ethnic Minorities	4 SH	CIN U460	Jewish Film	4 SH
AFR U307	Africa Today	4 SH	CJ U102	Ethics, Values, and Diversity	4 SH
AFR U320	The Black Family	4 SH	CJ U522	Comparative Criminal Justice	4 SH
AFR U325	African-American Women	4 SH	ECN U270	Economic Status of Ethnic Minorities	4 SH
AFR U337	African-American History before 1900	4 SH	ENG U671	Multiethnic Literature of the U.S.	4 SH
AFR U338	African-American History since 1900	4 SH	ENG U672	Asian-American Literature	4 SH
AFR U365	Blacks and Jews	4 SH	ENG U673	U.S. Latino/Latina Literature	4 SH
AFR U391	Modern African Civilization	4 SH	ENG U674	American Indian Literature	4 SH
AFR U392	African Diaspora	4 SH	ENG U675	Gay and Lesbian Literature	4 SH
AFR U399	Black Community and Social Change	4 SH	HNR U300	Topics in Research and Inquiry: A Diversity Perspective	4 SH
AFR U460	Contemporary Government and Politics in Africa	4 SH	HNR U320	Topics in Urban Experience: A Diversity Perspective	4 SH
AFR U609	History of South Africa	4 SH	HNR U340	Topics in Contemporary Issues: A Diversity Perspective	4 SH
			HS U560	Religion, Human Services, and Diversity in the United States	4 SH
			HST U103	Women's Studies	4 SH
			HST U140	Introduction to African-American History	4 SH
			HST U150	East Asian Studies	4 SH
			HST U180	African History	4 SH
			HST U204	Third World Women	4 SH
			HST U212	History of Race	4 SH
			HST U242	Women in America	4 SH
			HST U256	Chinese Civilization in Her Eyes	4 SH
			HST U261	The Modern Caribbean	4 SH
			HST U290	Modern Middle East	4 SH
			HST U337	African-American History before 1900	4 SH
			HST U338	African-American History since 1900	4 SH
			HST U350	Modern China	4 SH
			HST U351	Japan since 1850	4 SH
			HST U372	Gender and Society in Modern Europe	4 SH
			HST U391	Modern African Civilization	4 SH
			HST U392	African Diaspora	4 SH
			HST U393	Islam and Empires	4 SH
			HST U394	Islamic Nationalism	4 SH
			HST U432	Latin America in Boston	4 SH
			INT U285	Jewish Religion and Culture	4 SH
			INT U560	Religion, Human Services, and Diversity in the United States	4 SH
			LNC U150	Backgrounds of Chinese Culture	4 SH
			LNC U255	Chinese Film: Gender and Ethnicity	4 SH
			LNC U256	Chinese Civilization in Her Eyes	4 SH
			LNF U150	Introduction to French Culture	4 SH
			LNJ U150	Introduction to Japanese Pop Culture	4 SH
			LNR U285	Russian Civilization	4 SH
			LNS U150	Spanish Culture	4 SH
			LNS U160	Latin American Culture	4 SH

LNS U170	Caribbean Literature and Culture	4 SH
MTH U201	History of Mathematics	4 SH
MUS U106	Women in Music	4 SH
MUS U128	Music of Africa	4 SH
MUS U130	Music of Asia	4 SH
MUS U131	Music of Latin America and the Caribbean	4 SH
MUS U132	Music of the Jewish People	4 SH
PHL U103	Women's Studies	4 SH
PHL U130	Ethics: East and West	4 SH
PHL U270	Western Religions	4 SH
PHL U275	Eastern Religions	4 SH
PHL U280	Islam	4 SH
PHL U285	Jewish Religion and Culture	4 SH
PHL U290	Chinese Philosophy and Religion	4 SH
POL U375	Gender and Politics	4 SH
POL U380	Latino Politics in the United States	4 SH
POL U460	Government and Politics in Africa	4 SH
POL U465	Government and Politics in the Middle East	4 SH
POL U470	Arab-Israeli Conflict	4 SH
POL U475	Government and Politics in Latin America	4 SH
POL U480	Government and Politics in Japan	4 SH
POL U485	Government and Politics in China	4 SH
POL U487	Politics of Developing Nations	4 SH
SOA U101	Peoples and Cultures	4 SH
SOA U200	Peoples and Cultures of the Middle East	4 SH
SOA U210	Hot Button Issues in the Middle East	4 SH
SOA U220	Latino, Latin American, and Caribbean Studies	4 SH
SOA U302	Gender and Sexuality: A Cross-Cultural Perspective	4 SH
SOA U307	Social Movements in the Third World	4 SH
SOA U310	Individual Culture	4 SH
SOA U315	Religion and Modernity	4 SH
SOA U400	Muslims, Jews, and Christians in the Middle East	4 SH
SOA U500	Latin American Society and Development	4 SH
SOA U505	Native North Americans	4 SH
SOC U215	Society and Culture in Russia	4 SH
SOC U260	Gender in a Changing Society	4 SH
SOC U270	Race and Ethnic Relations	4 SH
SOC U460	Sociology of Latino Society	4 SH
SOC U520	Race, Class, and Gender	4 SH

BSCS—Bachelor of Science in Computer Science

ENGLISH REQUIREMENT

Complete the following course:

ENG U111	College Writing	4 SH
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and one approved Advanced Writing in the Disciplines course for the major. A grade of C or higher is required in both courses.

MATHEMATICS, SCIENCE, AND SOCIAL SCIENCE CORE FOR BS

Sociology

Complete the following course:

SOC U528	Computers and Society	4 SH
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Symbolic Logic

Complete the following course with a grade of C– or higher:

PHL U215	Symbolic Logic	4 SH
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Mathematics Courses

Complete the following four courses. A grade of C– or higher is required in MTH U241 and MTH U242:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U371	Linear Algebra	4 SH
MTH U481	Probability and Statistics	4 SH

Science Requirement

Complete a pair of courses with corresponding lab and recitation for one of the following sciences:

BIOLOGY

Complete either lecture/lab from the Biology 1 section and then complete an additional lecture/lab:

BIOLOGY 1

BIO U101	Principles of Biology 1	4 SH
with BIO U102	Lab for BIO U101	1 SH
BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH

ADDITIONAL BIOLOGY

BIO U103	Principles of Biology 2	4 SH
with BIO U104	Lab for BIO U103	1 SH
BIO U113	General Biology 2	4 SH
with BIO U114	Lab for BIO U113	1 SH
BIO U301	Genetics and Molecular Biology	4 SH
with BIO U302	Lab for BIO U301	1 SH

CHEMISTRY

CHM U211	General Chemistry 1	4 SH
with CHM U212	Lab for CHM U211	1 SH
CHM U214	General Chemistry 2	4 SH
with CHM U215	Lab for CHM U214	1 SH

GEOLOGY

Complete two sets of lecture/labs from one group:

GROUP 1

GEO U200	Dynamic Earth	4 SH
with GEO U201	Lab for GEO U200	1 SH
GEO U220	History of Earth and Life	4 SH
with GEO U221	Interpreting Earth History	1 SH

GROUP 2

GEO U200	Dynamic Earth	4 SH
with GEO U201	Lab for GEO U200	1 SH
GEO U310	Earth Materials	4 SH
with GEO U311	Lab for GEO U310	1 SH
GEO U340	Earth Landforms and Processes	4 SH
with GEO U341	Lab for GEO U340	1 SH
GEO U520	Applied Hydrogeology	4 SH
with GEO U521	Lab for GEO U520	1 SH
GEO U544	Sedimentation	4 SH
with GEO U545	Lab for GEO U544	1 SH
GEO U546	Coastal Processes	4 SH
with GEO U547	Lab for GEO U546	1 SH
GEO U560	Geographic Information Systems	4 SH
with GEO U561	Lab for GEO U560	1 SH

GROUP 3			
GEO U220	History of Earth and Life	4 SH	
with GEO U221	Interpreting Earth History	1 SH	
GEO U542	Fossils and Paleoecology	4 SH	
with GEO U543	Lab for GEO U542	1 SH	

PHYSICS

Complete one group of courses:

GROUP 1			
PHY U161	Physics 1	4 SH	
with PHY U162	Lab for PHY U161	1 SH	
PHY U165	Physics 2	4 SH	
with PHY U166	Lab for PHY U165	1 SH	

GROUP 2

PHY U145	Physics for Life Sciences 1	4 SH	
with PHY U146	Lab for PHY U145	1 SH	
PHY U147	Physics for Life Sciences 2	4 SH	
with PHY U148	Lab for PHY U147	1 SH	

GROUP 3

PHY U151	Physics for Engineering 1	4 SH	
with PHY U152	Lab for PHY U151	1 SH	
PHY U155	Physics for Engineering 2	4 SH	
with PHY U156	Lab for PHY U155	1 SH	

Electrical Engineering

Complete the following course:

ECE U230	Computer Architecture for Computer Scientists	4 SH	
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COMPUTER SCIENCE MAJOR REQUIREMENTS**Computer Science Overview**

Freshmen or freshman transfers complete the following two courses:

CS U221	Computer/Information Science Overview 1	1 SH	
CS U222	Computer/Information Science Overview 2	1 SH	

Upper-level transfer students must complete the following course:

CS U223	Computer/Information Science Co-op Preparation	1 SH	
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and must also make up 1 semester hour of credit.

Computer Science Fundamental Courses

Complete the following three courses, with corresponding labs, as indicated. A grade of C– or higher is required in each course:

CS U200	Discrete Structures	4 SH	
CS U211	Fundamentals of Computer Science 1	4 SH	
with CS U212	Lab for CS U211	1 SH	
CS U213	Fundamentals of Computer Science 2	4 SH	
with CS U214	Lab for CS U213	1 SH	

Computer Science Required Courses

Complete the following seven courses:

CS U370	Object-Oriented Design	4 SH	
CS U380	Computer Organization	4 SH	
CS U390	Theory of Computation	4 SH	
CS U480	Systems and Networks	4 SH	

CS U660	Programming Languages	4 SH	
CS U670	Software Development	4 SH	
CS U690	Algorithms and Data	4 SH	

Computer Science Capstone

The computer science capstone is an extended activity that demands a significant individual effort, although it may be a team project as long as each student contributes substantial work. It generally consists of (1) a substantial programming or design project of at least one month in duration or (2) a research survey project in which the student explores and critically analyzes material beyond what is covered in a course and prepares a document to disseminate publicly what is learned to other members of the college. The requirement is usually satisfied through a course that is designated as a capstone course. See the college for a list of capstone courses.

Computer Science Senior Seminar

Complete the following course:

CS U600	Senior Seminar	1 SH	
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Computer Science Elective Courses

Complete three CS elective courses, including one capstone course. With adviser approval, directed study, project study, and appropriate graduate-level courses may also be taken as computer science electives.

CS U400 to CS U999

IS U535	Information Retrieval	4 SH	
or IS U570	Human Computer Interaction	4 SH	

DIVERSITY

Satisfy the diversity course option, the residence-abroad option, the international co-op/study-abroad option, or the community service option.

Diversity Course Option

Complete one course from the list “College of Computer and Information Science Approved Courses: Diversity” on page 194.

Residence-Abroad Option

Provide documentation that you lived in a country other than the United States or Canada for at least two years after your tenth birthday.

International Co-Op/Study-Abroad Option

Participate in a six-month international co-op assignment or study abroad in a country other than Canada.

Community Service Option

Complete one hundred hours of preapproved diversity-related community service and file a report describing the work completed.

ARTS AND SCIENCES CORE REQUIREMENTS

Complete two courses from either the foreign language option or from the arts, humanities, and social sciences option.

Foreign Language Option

Complete two courses in the same language with a grade of C or higher. Proficiency at elementary-level two or higher is required.

Arts, Humanities, and Social Sciences Option

Complete two courses from the following lists. Note that the following courses are unacceptable: PHL U114, PHL U115,

PHL U215, and SOC U528; any courses from the BIO, CHM, GEO, MTH, or PHY departments; and any courses that are explicitly required for the major.

“Approved Courses: Methods of Inquiry—Arts Context” on page 50.

“Approved Courses: Methods of Inquiry—Humanities Context” on page 50.

“Approved Courses: Methods of Inquiry—Social World Context” on page 51.

“College of Computer and Information Science Approved Courses: Diversity” on page 194.

“Approved Courses: Historical, Ethical, and Aesthetic Perspectives” on page 52.

“Approved Courses: Analysis” on page 53.

ELECTIVES OUTSIDE COMPUTER AND INFORMATION SCIENCE

Complete three courses from either the depth option or the breadth option, and complete three open electives.

Depth Option

Complete three courses in one department outside CS and IS, with at least one course at the intermediate level (300 level or above). For the purposes of this requirement, all business courses are considered to be in a single department.

Breadth Option

Complete three courses in arts, humanities, or social sciences.

Open Electives

Complete three courses from any department provided the courses are not more elementary than the courses taken to satisfy other requirements in the program.

MAJOR GPA REQUIREMENT

Minimum 2.000 GPA required in all CS and IS courses

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION

UNIVERSITY-WIDE REQUIREMENTS

135 total semester hours required

Minimum 2.000 GPA required

BACS—Bachelor of Arts in Computer Science

ENGLISH REQUIREMENT

Complete the following course:

ENG U111 College Writing 4 SH
and one approved Advanced Writing in the Disciplines course for the major. A grade of C or higher is required in both courses.

BA CORE REQUIREMENTS

Foreign Language

Complete two courses in the same language. Proficiency at elementary-level two or higher required.

Methods of Inquiry

Complete one course for each of the contexts below. Courses in the major may not be used.

ARTS CONTEXT

Complete one course from the list “Approved Courses: Methods of Inquiry—Arts Context” on page 50.

HUMANITIES CONTEXT

Complete the following course with a grade of C– or higher:

PHL U215 Symbolic Logic 4 SH

SOCIAL WORLD CONTEXT

Complete one course from the list “Approved Courses: Methods of Inquiry—Social World Context” on page 51.

Diversity

Complete two courses from the list “College of Computer and Information Science Approved Courses: Diversity” on page 194.

Historical, Ethical, and Aesthetic Perspectives

Complete two courses from the list “Approved Courses: Historical, Ethical, and Aesthetic Perspectives” on page 52.

Analysis

Complete the following course:

SOC U528 Computers and Society 4 SH

Required General Electives

Complete five general electives.

MATHEMATICS AND SCIENCE CORE FOR BA

Mathematics Courses

Complete the following three courses. A grade of C– or higher is required in MTH U241 and MTH U242:

MTH U241 Calculus 1 for Science and Engineering 4 SH

MTH U242 Calculus 2 for Science and Engineering 4 SH

MTH U481 Probability and Statistics 4 SH

Science Courses

Complete one course with corresponding lab and recitation for one of the following groups:

BIOLOGY

BIO U111 General Biology 1 4 SH

with BIO U112 Lab for BIO U111 1 SH

CHEMISTRY

CHM U101 General Chemistry for Health Sciences 4 SH

with CHM U102 Lab for CHM U101 1 SH

CHM U151 General Chemistry for Engineers 4 SH

with CHM U152 Lab for CHM U151 1 SH

GEOLOGY

GEO U200 Dynamic Earth 4 SH

with GEO U201 Lab for GEO U200 1 SH

GEO U220 History of Earth and Life 4 SH

with GEO U221 Interpreting Earth History 1 SH

PHYSICS

PHY U145 Physics for Life Sciences 1 4 SH

with PHY U146 Lab for PHY U145 1 SH

PHY U151 Physics for Engineering 1 4 SH

with PHY U152 Lab for PHY U151 1 SH

PHY U161 Physics 1 4 SH

with PHY U162 Lab for PHY U161 1 SH

COMPUTER SCIENCE MAJOR REQUIREMENTS**Computer Science Overview**

Freshmen or freshman transfers complete the following two courses:

CS U221	Computer/Information Science Overview 1	1 SH
CS U222	Computer/Information Science Overview 2	1 SH

Upper-level transfer students must complete the following course:

CS U223	Computer/Information Science Co-op Preparation	1 SH
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and must also make up 1 semester hour of credit.

Computer Science Fundamental Courses

Complete the following three courses with any applicable labs with a grade of C– or higher:

CS U200	Discrete Structures	4 SH
CS U211	Fundamentals of Computer Science 1	4 SH
with CS U212	Lab for CS U211	1 SH
CS U213	Fundamentals of Computer Science 2	4 SH
with CS U214	Lab for CS U213	1 SH

Computer Science Required Courses

Complete the following six courses:

CS U370	Object-Oriented Design	4 SH
CS U380	Computer Organization	4 SH
CS U390	Theory of Computation	4 SH
CS U480	Systems and Networks	4 SH
CS U670	Software Development	4 SH
CS U690	Algorithms and Data	4 SH

Computer Science Elective Courses

Complete two upper-division courses from the CS, IS, or MTH departments. Only one course may be selected from the MTH department. With adviser approval, directed study courses, project study courses, and appropriate graduate-level courses may also be taken as computer science electives.

CS U400 to CS U699		
IS U535	Information Retrieval	4 SH
or IS U570	Human Computer Interaction	4 SH
MTH U301 to MTH U699		

Computer Science Senior Seminar

Complete the following course:

CS U600	Senior Seminar	1 SH
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MAJOR GPA REQUIREMENT

Minimum 2.000 GPA required in all CS and IS courses

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION**UNIVERSITY-WIDE REQUIREMENTS**

134 total semester hours required

Minimum 2.000 GPA required

Minor in Computer Science

The requirements for the minor in computer science are shown below. Students who wish to take a particular course must have taken its prerequisites listed in the catalog.

REQUIRED COURSES

Complete the following two courses with corresponding labs.

A grade of C– or higher is required:

CS U211	Fundamentals of Computer Science 1	4 SH
with CS U212	Lab for CS U211	1 SH
CS U213	Fundamentals of Computer Science 2	4 SH
with CS U214	Lab for CS U213	1 SH

COMPUTER SCIENCE ELECTIVES

Complete three courses from the following list:

CS U300 to CS U699		
IS U535	Information Retrieval	4 SH
IS U570	Human Computer Interaction	4 SH

GPA REQUIREMENT

2.000 GPA required in the minor

Information Science

Making the most of information technology—ensuring that it serves the goals and needs of users, clients, and society—is a tremendous challenge, one that requires a unique blend of knowledge and skills. The field of information science (IS) focuses on the relationship between computers, the people who use them, and the contexts in which they operate. IS seeks to further our understanding of: 1) information itself: where it comes from, how it is organized, and how it is used; 2) the design of computer applications that are usable, socially acceptable, and achieve the goals for which they were created; 3) the impact of information technology (IT) on human life and work; and 4) how the nature of the information, the goals of the users, and the relevant social policies and laws both influence and are influenced by the technical aspects of computer systems.

Information science majors acquire a strong technical foundation by taking classes in mathematics, logic, and computer science. They also require a strong foundation in behavioral science by taking classes in cognitive psychology, economics, and statistics. A course in the principles of information science introduces students to important intellectual frameworks such as decision theory, general systems theory, and social informatics, and to topics of current importance such as digital copyright, trusted systems, and Internet privacy policy. Building on these foundations, the IS core develops expertise in the design, management, and evaluation of information technology-based resources and systems. Elective courses cover topics such as text/hypertext retrieval, artificial intelligence, information security, e-commerce, and data mining.

BSIS—Bachelor of Science in Information Science**ENGLISH REQUIREMENT**

Complete the following two courses:

ENG U111	College Writing	4 SH
ENG U302	Advanced Writing in the Technical Professions	4 SH

A grade of C or higher is required in both courses.

BEHAVIORAL SCIENCE FOUNDATIONS**Sociology**

Complete the following course:

SOC U528	Computers and Society	4 SH
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Psychology

Complete the following two courses:

PSY U101	Foundations of Psychology	4 SH
PSY U466	Cognition	4 SH

Economics

Complete the following course:

ECN U116	Principles of Microeconomics	4 SH
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Organizational Behavior

Complete the following course:

HRM U201	Organizational Behavior	4 SH
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MATHEMATICS AND SCIENCE REQUIREMENTS**Statistics and Calculus**

Complete the following two courses. A grade of C– or higher is required in MTH U241:

ECN U350	Statistics	4 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH

Symbolic Logic

Complete the following course with a grade of C– or higher:

PHL U215	Symbolic Logic	4 SH
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Science Elective

Complete one course, with corresponding lab if applicable, from the natural world context option or the science option.

NATURAL WORLD CONTEXT OPTION

Excluding courses in the MTH department and courses intended for students in specific colleges, complete one course with any corresponding lab from the list “Approved Courses: Methods of Inquiry—Natural World Context” on page 50.

SCIENCE OPTION

Complete one course with the corresponding lab and recitation from one of the following groups:

BIOLOGY

BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH

CHEMISTRY

CHM U101	General Chemistry for Health Sciences	4 SH
with CHM U102	Lab for CHM U101	1 SH
CHM U151	General Chemistry for Engineers	4 SH
with CHM U152	Lab for CHM U151	1 SH

GEOLOGY

GEO U200	Dynamic Earth	4 SH
with GEO U201	Lab for GEO U200	1 SH

GEO U220	History of Earth and Life	4 SH
with GEO U221	Interpreting Earth History	1 SH
PHYSICS		
PHY U145	Physics for Life Sciences 1	4 SH
with PHY U146	Lab for PHY U145	1 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH

COMPUTER SCIENCE COURSES**Computer Science Overview**

Freshmen or freshman transfers must complete the following two courses:

CS U221	Computer/Information Science Overview 1	1 SH
CS U222	Computer/Information Science Overview 2	1 SH

Upper-level transfer students must complete the following course:

CS U223	Computer/Information Science Co-op Preparation	1 SH
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and must also make up 1 semester hour of credit.

Computer Science Fundamental Courses

Complete the following three courses, with corresponding labs as indicated. A grade of C– or higher is required in each course:

CS U200	Discrete Structures	4 SH
CS U211	Fundamentals of Computer Science 1	4 SH
with CS U212	Lab for CS U211	1 SH
CS U213	Fundamentals of Computer Science 2	4 SH
with CS U214	Lab for CS U213	1 SH

Computer Science Required Courses

Complete the following two courses:

CS U370	Object-Oriented Design	4 SH
CS U380	Computer Organization	4 SH

INFORMATION SCIENCE COURSES**Required Courses in Information Science**

Complete the following five courses:

IS U300	Principles of Information Science	4 SH
IS U570	Human Computer Interaction	4 SH
IS U580	Empirical Research Methods	4 SH
IS U691	Information Science Field Study	1 SH
IS U692	Information Science Senior Project	5 SH

Databases and Networks

Complete the following two courses:

CS U430	Database Design	4 SH
CS U480	Systems and Networks	4 SH

Information System Design and Development

Complete the following course:

IS U470	Information System Design and Development	4 SH
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Managing Information

Complete the following course:

MIS U305	Information Resource Management	4 SH
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Information Science Electives

Complete two courses from the following list:

ACC U209	Financial Accounting and Reporting	4 SH
ACC U403	Accounting Information Systems	4 SH
CMN U231	Principles of Organizational Communication	4 SH
CMN U531	Advanced Organizational Communication	4 SH
CMN U532	Theories of Conflict and Negotiation	4 SH
CS U300 to CS U999		
ECN U560	Applied Econometrics	4 SH
ENG U450	Syntax	4 SH
ENG U452	Semantics	4 SH
IS U301 to IS U999		
LIN U450	Syntax	4 SH
LIN U452	Semantics	4 SH
LIN U464	Psychology of Language	4 SH
LIN U520	Language and the Brain	4 SH
LIN U610	Laboratory in Psycholinguistics	4 SH
MIS U408	Knowledge Management	4 SH
MIS U501	Business Systems Integration	4 SH
POL U390	Science, Technology, and Public Policy	4 SH
PSY U450	Learning and Motivation	4 SH
PSY U452	Introduction to Sensation and Perception	4 SH
PSY U458	Psychobiology	4 SH
PSY U464	Psychology of Language	4 SH
PSY U520	Language and the Brain	4 SH
PSY U604	Laboratory in Learning and Motivation	4 SH
PSY U606	Laboratory in Psychobiology	4 SH
PSY U610	Laboratory in Psycholinguistics	4 SH
PSY U612	Laboratory in Cognition	4 SH
PSY U622	Laboratory in Sensation and Perception	4 SH

DIVERSITY

Satisfy the diversity course option, the residence-abroad option, the international co-op/study-abroad option, or the community service option.

Diversity Course Option

Complete one course from the list “College of Computer and Information Science Approved Courses: Diversity” on page 194.

Residence-Abroad Option

Provide documentation that you lived in a country other than the United States or Canada for at least two years after your tenth birthday.

International Co-Op/Study-Abroad Option

Participate in a six-month international co-op assignment or study abroad in a country other than Canada.

Community Service Option

Complete one hundred hours of preapproved diversity-related community service and file a report describing the work completed.

ARTS AND SCIENCES CORE REQUIREMENTS

Complete two courses from either the foreign language option or from the arts, humanities, and social sciences option.

Foreign Language Option

Complete two courses in the same language with a grade of C or higher. Proficiency at elementary-level two or higher is required.

Arts, Humanities, and Social Sciences Option

Complete two courses from the following lists. Note that the following courses are unacceptable:

PHL U114, PHL U115, PHL U215, and SOC U528; any courses from the BIO, CHM, GEO, MTH, or PHY departments; and any courses that are explicitly required for the major.

“Approved Courses: Methods of Inquiry—Arts Context” on page 50.

“Approved Courses: Methods of Inquiry—Humanities Context” on page 50.

“Approved Courses: Methods of Inquiry—Social World Context” on page 51.

“College of Computer and Information Science Approved Courses: Diversity” on page 194.

“Approved Courses: Historical, Ethical, and Aesthetic Perspectives” on page 52.

“Approved Courses: Analysis” on page 53.

REQUIRED GENERAL ELECTIVES

Complete four general electives.

MAJOR GPA REQUIREMENT

Minimum 2.000 GPA required in all CS and IS courses

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION**UNIVERSITY-WIDE REQUIREMENTS**

134 total semester hours required

Minimum 2.000 GPA required

Minor in Information Science

The requirements for the minor in information science are shown below. Students who wish to take a particular course must have taken its prerequisites listed in the catalog.

REQUIRED COURSES

Complete the following three courses with corresponding labs; a grade of C– or higher is required in CS U211 and CS U213:

CS U211	Fundamentals of Computer Science 1	4 SH
with CS U212	Lab for CS U211	1 SH
CS U213	Fundamentals of Computer Science 2	4 SH
with CS U214	Lab for CS U213	1 SH
IS U300	Principles of Information Science	4 SH

INFORMATION SCIENCE ELECTIVES

Complete two courses from the following list:

CS U430	Database Design	4 SH
IS U300 to IS U699		

GPA REQUIREMENT

2.000 GPA required in the minor

Dual Majors

The college offers four dual majors with biology, cognitive psychology, mathematics, and physics, as well as a dual major in computer science and information science. Each of the dual majors offers the opportunity for intense study in two disciplines with appropriate breadth in the liberal arts. Students take eight to ten courses in each discipline and two or three integrative courses that bind the disciplines together. These programs offer an excellent educational opportunity for the ambitious student.

BS in Computer Science and Information Science**ENGLISH REQUIREMENT**

Complete the following course:

ENG U111 College Writing 4 SH
and one approved Advanced Writing in the Disciplines course for the major. A grade of C or higher is required in both courses.

COMPUTER SCIENCE MAJOR REQUIREMENTS**Computer Science Overview**

Freshmen or freshman transfers complete the following two courses:

CS U221 Computer/Information Science Overview 1 SH
CS U222 Computer/Information Science Overview 2 1 SH

Upper-level transfer students must complete the following course:

CS U223 Computer/Information Science Co-op Preparation 1 SH

and must also make up 1 semester hour of credit.

Computer Science Fundamental Courses

Complete the following three courses, with corresponding labs, as indicated. A grade of C– or higher is required in each course:

CS U200 Discrete Structures 4 SH
CS U211 Fundamentals of Computer Science 1 4 SH
with CS U212 Lab for CS U211 1 SH
CS U213 Fundamentals of Computer Science 2 4 SH
with CS U214 Lab for CS U213 1 SH

Computer Science Required Courses

Complete the following eight courses:

CS U370 Object-Oriented Design 4 SH
CS U380 Computer Organization 4 SH
CS U390 Theory of Computation 4 SH
CS U430 Database Design 4 SH
CS U480 Systems and Networks 4 SH
CS U660 Programming Languages 4 SH
CS U670 Software Development 4 SH
CS U690 Algorithms and Data 4 SH

INFORMATION SCIENCE COURSES**Information Science Required Courses**

Complete the following five courses:

IS U300 Principles of Information Science 4 SH
IS U570 Human Computer Interaction 4 SH
IS U580 Empirical Research Methods 4 SH
IS U691 Information Science Field Study 1 SH
IS U692 Information Science Senior Project 5 SH

Information System Design and Development

Complete the following course:

IS U470 Information System Design and Development 4 SH

Managing Information

Complete the following course:

MIS U305 Information Resource Management 4 SH

INFORMATION SCIENCE BEHAVIORAL SCIENCE FOUNDATIONS**Sociology**

Complete the following course:

SOC U528 Computers and Society 4 SH

Psychology

Complete the following course:

PSY U101 Foundations of Psychology 4 SH

Economics

Complete the following course:

ECN U116 Principles of Microeconomics 4 SH

Organizational Behavior

Complete the following course:

HRM U209 Organizational Behavior 4 SH

MATHEMATICS AND SCIENCE REQUIREMENTS**Calculus and Statistics**

Complete the following two courses. A grade of C– or higher is required in MTH U241:

ECN U350 Statistics 4 SH
MTH U241 Calculus 1 for Science and Engineering 4 SH

Symbolic Logic

Complete the following course with a grade of C– or higher:

PHL U215 Symbolic Logic 4 SH

Linear Algebra

Complete the following course:

MTH U371 Linear Algebra 4 SH

Science Elective

Complete one course, with corresponding lab if applicable, from the natural world context option or the science option.

NATURAL WORLD CONTEXT OPTION

Excluding courses in the MTH department and courses intended for students in specific colleges, complete one course with any corresponding labs from the list “Approved Courses: Methods of Inquiry—Natural World Context” on page 50.