SCHOOL OF COMPUTER
SCIENCE, TELECOMMUNICATIONS
AND INFORMATION SYSTEMS
ADMINISTRATION

HELMUT EPP, Ph.D.
Dean

DAVID MILLER, Ph.D.
Associate Dean

JACOB D. FURST, Ph.D.
Associate Dean

LINDA V. KNIGHT, Ph.D.
Associate Dean

ANNE B. MORLEY
Assistant Dean

TERRY SKWAREK
Director, Institute for Professional Development
Assistant Dean

HENRY HARR, Ph.D.
Director of Undergraduate Studies

STEVE JOST, Ph.D.
Associate Director of Undergraduate Studies

JOHN GLATZ,
Director, Student Services

FACILITIES

FACULTY

ADMISSION

ACADEMIC PROGRAMS

Bachelor of Science in Computer Graphics and Animation
Bachelor of Science in Computer Science
  Standard Computer Science
  Data Analysis and Database
  Telecommunications
Bachelor of Science in E-Commerce Technology
Bachelor of Science in Human- Computer Interaction
Bachelor of Science in Information Systems
Bachelor of Science in Network Technology
Bachelor of Arts in Computing

COURSES
The School of Computer Science, Telecommunications and Information Systems offers a course of studies leading to the degrees of Bachelor of Science in Computer Science, Bachelor of Science in Information Systems, Bachelor of Science in Human-Computer Interaction, and Bachelor of Arts in Computing. The purpose of each curriculum is to prepare the student with the requisite theoretical, technical, and practical knowledge for a professional career in various computer or computer-related fields. Each degree program develops an informed view of the relationship between computer science and its allied fields while equipping the student with the technical expertise necessary to enter a computer-related career.

Facilities

DePaul's Information System Division (ISD) houses a large network of computers and allows students access to a rich computing environment. The configuration includes several Sun SPARC centers for student use. In addition, students have access to IBM PC laboratories and Macintosh laboratories at the Loop and Lincoln Park campuses. There are numerous dial-up phone numbers available for off-campus work. DePaul's suburban campuses, in the Naperville, O'Hare and South areas also offer excellent student laboratory facilities. Permanent student Internet access accounts are available along with dial-in SLIP connections.

The School itself operates specialized laboratories for artificial intelligence, computer vision and graphics, database, programming languages, software engineering, telecommunications, local area networks and computer telephony. One laboratory allows students to explore specialized software. The laboratories include both PCs and UNIX workstations. The school also operates an IBM ES 9000/9221.

Faculty

Helmut Epp, Ph.D.,
Associate Professor and Dean
Northwestern University

Olayele Adelakun, Ph.D.,
Assistant Professor
Turku School of Economics and Business Administration

L. Edward Allemand, Ph.D.,
Professor Emeritus
University of Louvain

Ehab Al-Shaer, Ph.D.,
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Old Dominion University

Aftab Ahmad, Ph.D.,
Associate Professor
George Washington University

Gary Andrulis, Ph.D.,
Associate Professor
Wayne State University

Andre Berthiaume, Ph.D.,
Assistant Professor
University of Montreal

Gregory Brewster, Ph.D.,
Associate Professor
University of Wisconsin

Jacek Brzezinski, Ph.D.,
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Susy Chan, Ph.D.,
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Syracuse University

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Kent State University

Roymieco Carter, M.F.A.,
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University of Oregon
STEVE JOST, Ph.D.,
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KING-LUP LIU, Ph.D.,
Visiting Assistant Professor
University of Illinois at Chicago
STEVE LYTINEN, Ph.D.,
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Yale University
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Assistant Professor and Associate Dean
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University of Arizona
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JOHN ROGERS, Ph.D.,
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DeAndres University

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Visiting Assistant Professor
Concordia University

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NORIKO TOMURO, Ph.D.,
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CURT M. WHITE, Ph.D.,
Associate Professor
Wayne State University

ROSALIE WOLFE, Ph.D.,
Professor
Indiana University

YONGHE YAN, Ph.D.,
Assistant Professor
University of Hong Kong

CHONGHUA ZHANG, M.S.,
Adjunct Professor
DePaul University
ADMISSION
Candidates interested in admission to the school should direct all inquiries to the Office of Admission, DePaul University, 1 E. Jackson Boulevard, Chicago, Illinois 60604. Telephone (312) 362-8300; e-mail: admittiu@wppost.depaul.edu. The Office of Admission will provide each candidate with the required forms and instructions for filing the application or visit the web site at www.depaul.edu to apply on-line. A non-refundable application fee of $25.00 is required of each applicant. For further information on the regulations and procedures governing admission, consult page 441 of the Bulletin.

ACADEMIC ADVISEMENT
The school believes that academic advisement is necessary for the vitality and success of the student's undergraduate education. The purposes of liberal education require that the education of the student form a coherent whole. Therefore, the requirements of the Liberal Studies Program and to a degree the major field of study are determined by the individual student's intellectual interests, needs and abilities.

Students will be assigned a faculty advisor upon admission to the school. Academic approval of a course of study is required of all students in the school. All students are encouraged to meet with their faculty advisor at least once each year to plan their course of study.

PROFESSIONAL DEVELOPMENT
The School of Computer Science, Telecommunications and Information Systems established the Institute for Professional Development in 1985 to offer certificate programs designed to meet the needs of both individuals and businesses in the Chicagoland area. These non-degree offerings provide intensive training in a wide variety of areas, with each stand-alone certificate program addressing a different set of theoretical concepts and practical skills. Emphasis is placed on gaining practical experience through a combination of lectures and demonstrations complemented by laboratory exercises and homework assignments.

Each certificate program is taught by a team of instructors that includes full-time faculty with consulting experience and part-time instructors from industry. Each program requires a substantial commitment of time, as classes meet two nights per week and in the morning on half of the Saturdays during the program.

For application and registration information pertaining to the certificate programs offered by the Institute for Professional Development, please call the Institute office at (312) 362-6282.

TRANSFER CREDIT
Prospective students may transfer credit from an accredited college to DePaul University. All transfer credit will be initially evaluated by an Admission counselor; final course placement will be made by an academic advisor in the School of Computer Science, Telecommunications and Information Systems (CTI). For specific information governing transfer admission and evaluation of credit, please consult page 442 of this Bulletin.

Current CTI students may take courses at another accredited college either in the summer or during the regular school year and transfer the credit back to DePaul University only with prior approval from the students academic advisor.

GRADES
Students must earn grades of 'C' or above in all courses taken for credit in the major field. Grades of 'C-' may be accepted for major field credit provided the overall grade point average within the major is 2.0 or above. All other courses require grades of 'D' or better. In addition, all students must fulfill the graduation requirements as noted on page 469 of this Bulletin.
MINORS
A minor is a combination of courses that provides a cohesive introduction to an area of study. Typically, courses taken to satisfy minor field requirements are credited as open electives; however, there are some instances where minor field courses may be used for credit in other areas of the student's curriculum. Grades for all courses taken to fulfill a minor field requirement must be 'C' or above. Grades of 'C-' may be accepted for credit in the minor provided the minor GPA is 2.0 or above. A minimum of one-half of the courses required for a minor must be completed at DePaul University.

MINORS IN THE COLLEGE OF COMMERCE
Students enrolled in the School of Computer Science, Telecommunications and Information Systems (CTI) may obtain a minor in Accounting, Economics, Management, Marketing and Pre-MBA. CTI students wishing to pursue a minor in the College of Commerce must complete the Declaration of Minor form; this form is available in either the College of Commerce or the School of CTI.

ACCOUNTING MINOR

ECONOMICS MINOR
Courses listed with an * may be taken for Liberal Studies credit.  
Option 1: ICS 200 Introduction to Business; ECO 105 Principles of Microeconomics; *ECO 106 Principles of Macroeconomics; Three ECO electives.  
Option 2: ECO 105 Principles of Microeconomics; ECO 106 Principles of Macroeconomics; Four ECO electives.

MANAGEMENT MINOR

MARKETING MINOR
ICS 200 Introduction to Business; MKT 301 Principles of Marketing; MKT 310 Consumer Behavior; MKT 305 Introduction to Marketing Research; Two MKT electives.

PRE-MBA MINOR
Courses listed with an * may be substituted with course work in the major field. Courses listed with a ** may be taken for Liberal Studies credit.  
MINORS IN THE COLLEGE OF LIBERAL ARTS AND SCIENCES

Students enrolled in the School of Computer Science, Telecommunications and Information Systems (CTI) may obtain a minor through the College of Liberal Arts and Sciences. Most Liberal Arts and Science departments offer minor concentrations of study. In general, a minor in a Liberal Arts and Sciences discipline consists of a set of introductory courses plus another set of more specialized courses. Most minors require six courses, some of which may also be used for credit in the Liberal Studies Program. For a complete list of minors offered through the College of Liberal Arts and Sciences, please consult page 83 of the 1999-2000 Undergraduate Bulletin.

MODERN LANGUAGE OPTION

Students in the School of Computer Science, Telecommunications and Information Systems (CTI) may choose to study a modern language and use the credit earned from the language courses to satisfy Liberal Studies domain requirements. Students reduce their Liberal Studies domain requirements by two courses if they complete a three-course language sequence. From the following combinations of learning domains, students can select their two course reduction: Philosophical Inquiry or Religious Dimensions; Understanding the Past or Self, Society and the Modern World; Arts and Literature (at most one course from each combination). The third course in the three-course language sequence may apply as open elective credit only.

BACHELOR OF SCIENCE

LIBERAL STUDIES PROGRAM

The student’s course of study in the Liberal Studies Program is part of the undergraduate program devoted exclusively to liberal education. The program seeks to balance and, when necessary, augment the student's course in the major field. In addition to the 24 quarter hours required in the liberal studies core, all students in the School are required to complete 52 quarter hours distributed through 6 learning domains as part of one degree program. The number and distribution of courses in each of the areas are as follows:

Liberal Studies Core: 6 courses/24 quarter hours required
First Year Program: (16 quarter hours required) Discover Chicago or Explore Chicago, Focal Point Seminar, and Composition and Rhetoric I and II.
Sophomore Seminar: (4 quarter hours required) Sophomore Seminar on Multiculturalism in the United States
Junior Year Experiential Learning: (4 quarter hours required) If your junior year experiential learning requirement also fulfills a major field requirement, you may substitute a liberal studies domain elective (from outside your major field area) or the third course in the modern language option for this requirement.
Senior capstone: All CTI majors require that students complete the senior capstone their major field.

Liberal Studies Learning Domains: 13 courses/52 quarter hours required
Arts and Literature: 12 quarter hours required. At most 2 courses from the same department or program. (ART 102 is required for the Bachelor of Science in Computer Graphics and Animation technical designer concentration.)
Philosophical Inquiry: 8 quarter hours required.
Religious Dimensions: 8 quarter hours required; 4 quarter hours in patterns and problems, and 4 quarter hours in traditions in context. Note: One course from either Philosophical Inquiry or Religious Dimensions must be a course in ethics. PHL/REL/MGT 228 is strongly recommended.
SCHOOL OF COMPUTER SCIENCE, TELECOMMUNICATIONS AND INFORMATION SYSTEMS

Scientific Inquiry: 4 quarter hours required. The course must be designated as a lab course. Courses in mathematics or CTI are not acceptable.

Self, Society and the Modern World: 12 quarter hours required. At most 2 courses from the same department or program. (Psychology 105 is required for the Human-Computer Interaction degree).

Understanding the Past: 8 quarter hours required; 4 quarter hours of history pre-1800 and 4 quarter hours of history 1800-1945. In addition, courses must be from two different categories: 1) Asia, 2) Latin America, 3) Africa, 4) North America or Europe; 5) intercontinental or comparative.

Although study in CTI courses contributes to a student's liberal education, courses offered through CTI may not be applied towards liberal studies requirements.

BACHELOR OF SCIENCE IN COMPUTER GRAPHICS AND ANIMATION

I. DEVELOPER CONCENTRATION
The developer concentration in the B.S. in Computer Graphics and Animation degree emphasizes software development for such areas as computer animation, video gaming, multimedia, and special effects. It prepares students for such careers as games development, visualization, and modeling.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. See your advisor for help in choosing your classes.

Allied Fields
Communication (CMN) 220 Public Speaking
English (ENG) 204 Technical Writing
Human-Computer Interaction (HCI) 315 Theory and Perception of Color
Mathematics (MAT) 140 Discrete Mathematics I, 150 Calculus I, 151 Calculus II, 220 Linear Algebra

Core

Six Computer Graphics and Animation electives chosen from the list below in consultation with the student's advisor. Courses from the list which were previously used to satisfy specific requirements may not be chosen as electives.

Open Electives
Four courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.
II. TECHNICAL DESIGNER CONCENTRATION

The technical designer concentration in the B.S. in Computer Graphics and Animation degree prepares students to support and engage in the visual aspects of the graphics and entertainment industry, including such careers as technical director for computer animation, games designer and new media consultant.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. See your advisor for help in choosing your classes.

Allied Fields

- Art (ART) 102 Principles of Art History, 106 Beginning Drawing, 203 Survey of Non-Western Art, 222 Contemporary Art
- Communication (CMN) 220 Public Speaking
- Computer Science (CSC) 211 Programming in Java I, 255 Information Structures and Representations, 336 Visual Basic for Programmers
- English (ENG) 204 Technical Writing
- Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction, 315 Theory and Perception of Color
- Mathematics (MAT) 140 Discrete Mathematics I

Core


Six Computer Graphics and Animation electives chosen from the list below in consultation with the student's advisor. Courses from the list which were previously used to satisfy specific requirements may not be chosen as electives.

Open Electives

Four courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.

Computer Graphics and Animation Elective list: Courses from the list which were previously used to satisfy specific requirements may not be chosen as electives.


BACHELOR OF SCIENCE IN COMPUTER SCIENCE

I. COMPUTER SCIENCE CONCENTRATION

This concentration is designed for students who want a solid foundation in traditional computer science. It is more theoretical and technical and requires a more extensive analytical background. This concentration is designed to prepare students for advanced studies or for employment in computer science where extensive programming is required.
Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses
Computer Science (CSC) 200 Survey of Computer Technology, 211 Programming in Java I, 212 Programming in Java II, 313 Data Structures in Java
Mathematics (MAT) 140 Discrete Mathematics I

Sophomore Courses
Computer Science (CSC) 309 Object Oriented Programming in C++, 319 Database Technology, 323 Data Analysis and Statistical Software I
Mathematics (MAT) 150 Calculus I, 151 Calculus II
One course chosen from Mathematics (MAT) 141 Discrete mathematics II, 152 Calculus III or 220 Linear Algebra
One course chosen from Communication (CMN) 220 Public Speaking or 212 Small Group Communication

Junior Courses
Computer Science (CSC) 312 Assembly Language and Computer Organization, 321 Design and analysis of Algorithms, 343 Introduction to Operating Systems
Telecommunication Systems (TDC) 361 Basic Communication systems Information Systems (IS) 315 Analysis and Design Techniques
One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions

Senior Courses
Computer Science (CSC) 347 Concepts of Programming Languages, 394 Software Projects
One 300-level CTI elective to be chosen in consultation with student's advisor.

Open Electives
Eight courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in Liberal Studies

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be “C” or better. Grades of “C-” may be accepted provided the overall grade point average in the major is 2.0 or better.

II. DATA ANALYSIS AND DATABASE CONCENTRATION
This concentration emphasizes computer-based statistical analysis of data. It looks at the storage, retrieval, and post-processing of data from database systems. The concentration includes programming and design of applications; it develops a strong foundation in statistical concepts and theories and puts them into practice using statistical software.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses
Computer Science (CSC) 200 Survey of Computer Technology, 211 Programming in Java I, 212 Programming in Java II, 255 Information Structures and Representation
Mathematics (MAT) 140 Discrete Mathematics I

Sophomore Courses
Computer Science (CSC) 319 Database Technology
Mathematics (MAT) 150 Calculus I, 151 Calculus II
Telecommunication Systems (TDC) 31 Basic Communication Systems
One course chosen from Computer Science (CSC) 309 Object Oriented Programming in C++, 313 Data Structures in Java, 336 Visual Basic for Programmers or Information Systems
One course chosen from Mathematics (MAT) 141 Discrete Mathematics II, 152 Calculus III or 220 Linear Algebra

One course chosen from Communication (CMN) 220 Public Speaking or 212 Small Group Communication

Junior Courses

Computer Science (CSC), 323 Data Analysis and Statistical Software I, 324 Data Analysis and Statistical Software II, Information Systems (IS) 315 Analysis and Design Techniques

One course chosen from Computer Science (CSC) 328 Data Analysis for Experimenters or 334 Advanced Data Analysis

One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions

Senior Courses

One course chosen from Computer Science (CSC) 394 Software Projects or Information Systems (IS) 376 Information Systems Project

Two 300-level CTI electives to be chosen in consultation with student's advisor.

Open Electives

Nine courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in Liberal Studies

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.

III. TELECOMMUNICATIONS CONCENTRATION

This concentration is designed to provide focused coursework in networking technologies, including detailed instruction in data communications, local area networks, and voice telecommunications networks.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses

Computer Science (CSC) 200 Survey of Computer Technology, 211 Programming in Java I, 212 Programming in Java II

Mathematics (MAT) 140 Discrete Mathematics I

Sophomore Courses

Computer Science (CSC) 309 Object Oriented Programming in C++, 319 Database Technology, 323 Data Analysis and Statistical Software I

Mathematics (MAT) 150 Calculus I, 151 Calculus II

Telecommunication Systems (TDC) 361 Basic Communication Systems

One course chosen from Mathematics (MAT) 141 Discrete Mathematics II, 152 Calculus III or 220 Linear Algebra

One course chosen from Communication 220 (CMN) Public Speaking or 212 Small Group Communication

Junior Courses

Computer Science (CSC), 343 Introduction to Operating Systems, Information Systems (IS) 315 Analysis and Design Techniques

Telecommunication Systems (TDC) 362 Principles of Data Communications, 363 Introduction to Local Area Networks, 364 Voice Communications Technologies

One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions
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**Senior Courses**
- Computer Science (CSC) 394 Software Projects
- One 300-level TDC elective to be chosen in consultation with student's advisor
- One 300-level CTI elective to be chosen in consultation with student's advisor.

**Open Electives**
- Eight courses to be chosen in consultation with student's advisor.

**Note:** PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

**Note:** Grades for all courses in the student's major (i.e. non-Liberal Studies and non-Open Elective) must be “C” or better. Grades of “C-” may be accepted provided the overall grade point average in the major is 2.0 or better.

**BACHELOR OF SCIENCE IN E-COMMERCE TECHNOLOGY**

The Bachelor of Science program in E-Commerce Technology is a pioneering degree in an emerging technological field. With the explosive growth of the Internet, industries are increasingly employing Internet and related electronic commerce technologies. E-Commerce has expanded beyond its early roots in electronic funds transfer and data interchange to embrace the use of Internet technologies for such applications as Web-based retailing, electronic supply chain management, and Web publishing. This technical degree program is designed to meet that demand. Students earning a B.S. in E-Commerce Technology will acquire computer programming, user-centered design, and E-Commerce system development skills, as well as knowledge of the technology of databases, networking, and middleware.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

**First-Year Courses**
- Computer Science (CSC) 211 Programming in Java I, 255 Information Structures and Representation
- E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology, 270 Client Side Web Application Development
  - One course chosen from Mathematics (MAT) 140 Discrete Mathematics I or Business Math and Statistics (BMS) 125 Business Calculus I

**Sophomore Courses**
- Computer Science (CSC) 212 Programming in Java II, 319 Visual Basic for Programmers, 323 Database Technology, 336 Visual Basic for Programmers, 319 Database Technology, 323 Data Analysis and Statistical Software I
- E-Commerce Technology (ECT) 353 Server Side Web Application Development
  - One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions
  - One course chosen from Communication (CMN) 220 Public Speaking or 212 Small Group Communication

**Junior Courses**
- E-Commerce Technology (ECT) 355 E-Commerce Web Application Models
- Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction
- Information Systems (IS) 315 Analysis and Design Techniques, 370 Computer Information Systems
- Telecommunication Systems (TDC) 361 Basic Communication Systems
  - One course chosen from Marketing (MKT) 301 Principles of Marketing, Psychology (PSY) 380 Industrial and Organization Psychology or Art (ART) 260 Graphic Design I
Senior Courses

E-Commerce Technology (ECT) 359 ECT Senior Project, 372 Software Project Development & Management


Open Electives

Seven courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.

Bachelor of Science in Human-Computer Interaction

Human-Computer Interaction (HCI) is a multidisciplinary degree program designed to study methods that improve the working relationship between humans and computers. HCI practitioners enable individuals and groups to make more effective use of computers by creating better user interfaces and supportive surrounding environments. Drawing on principles from such diverse disciplines as art, psychology, engineering and computer science, HCI involves the analysis, design, development and evaluation of interfaces that are easy to use but powerful enough to accomplish complex tasks.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses

Computer Graphics and Animation (GPH) 211 Perceptual Principles for Digital Environments I, 212 Perceptual Principles for Digital Environments II
Computer Science (CSC) 225 Information Structures and Representation
Human-Computer Interaction (HCI) 270 Formatting Digital Pages I

Sophomore Courses

Communication (CMN) 220 Public Speaking, 212 Small Group Communication
Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction

Junior Courses

Human-Computer Interaction (HCI) 312 Analysis and Design for HCI, 350 Usability in Computer Systems, 360 Evaluating Human Computer Interaction

Two 300-level HCI electives to be chosen in consultation with student's advisor. See course lists below for HCI elective options

Senior Courses

Computer Science (CSC) 394 Software Projects

Three 300-level HCI electives to be chosen in consultation with student's advisor. See course lists for HCI electives below.
Open Electives

Nine courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society and PSY 105 Introductory Psychology I are required courses which are already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.

Course Lists for HCI Electives: The five HCI electives must be chosen from the following lists. At least one course must be chosen from each list.

List 1 (Design):
- Communication (CMN) 327 Argumentation and Debate, 329 Persuasion
- E-Commerce Technology (ECT)/Human-Computer Interaction (HCI) 341 Usability Issues E-Commerce
- Human-Computer Interaction (HCI) 315 Theory and Perception of Color, 390 Topics in HCI

List 2 (Computer Science):
- Human-Computer Interaction (HCI) 322 Multimedia, 332 User-Centered Web Development
- Telecommunication Systems (TDC) 361 Basic Communications Systems Information Systems (IS) 315 Analysis and Design Techniques

List 3 (Evaluation):

BACHELOR OF SCIENCE IN INFORMATION SYSTEMS

Information Systems is devoted to the application of computers and related technologies to organizational and business problems. IS professionals apply their knowledge of hardware, software, business processes and procedures to help organizations improve performance and meet tactical and strategic goals. IS graduates gain employment in a wide variety of positions, including business application programmers, help desk analysts, end user training and support personnel, database analysts, process consultants, user liaisons, and business system analysts.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses
- Computer Science (CSC) 211 Programming in Java I, 55 Information Structures and Representation
- E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology, 270 Client Side Web Application Development
- Mathematics (MAT) 140 Discrete Mathematics I
Sophomore Courses

Computer Science (CSC) 212 Programming in Java II, 319 Database Technology
Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction
Information Systems (IS) 313 Business Application Programming
One course chosen from Mathematics (MAT) 141 Discrete Mathematics II or 145 Calculus for Information Systems
One course chosen from Communication (CMN) 220 Public Speaking or 212 Small Group Communication

Junior Courses

Computer Science (CSC) 323 Data Analysis and Statistical Software
Telecommunication Systems (TDC) 361 Basic Communication Systems
One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions

Senior Courses

Information Systems (IS) 370 Computer Information Systems, 375 Object Oriented Analysis and Design, 376 Information Systems Project

Open Electives

Seven courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be "C" or better. Grades of "C-" may be accepted provided the overall grade point average in the major is 2.0 or better.

Bachelor of Science in Network Technologies

The Bachelor of Science in Network Technologies degree program is designed for students who wish to learn to select, justify, configure, and manage appropriate network technologies for a wide variety of business applications. Course topics include the foundations of networking, local area network design and management, Internet access technologies, routing, and interconnection technologies.

Nineteen (19) Liberal Studies courses (see above) plus the following 29 courses. Although all 29 courses are required, the grouping of the courses into First-Year, Sophomore, Junior, and Senior courses is a recommendation only. See your advisor for help in choosing your classes.

First-Year Courses

Computer Science (CSC) 211 Programming in Java I, 212 Programming in Java II
E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology, 270 Server Side Web Application Development
Mathematics (MAT) 140 Discrete Mathematics I
One course chosen from Mathematics (MAT) 141 Discrete Mathematics II or 145 Calculus for Information Systems
Sophomore Courses

Computer Science (CSC) 319 Database Technology, 323 Data analysis and Statistical Software
Telecommunication Systems (TDC) 311 Computers in Telecommunications Systems, 361 Basic Communication Systems
One course chosen from Communication (CMN) 220 Public Speaking or 212 Small Group Communication

Junior Courses

Computer Science (CSC) 336 Visual Basic for Programmers
E-Commerce Technology (ECT) 353 Server Side Web Application Development
Telecommunication Systems (TDC) 362 Principles of Data Communications, 363 Introduction to Local Area Networks, 365 Network Interconnection Technologies
One course chosen from English (ENG) 204 Technical Writing or 301 Writing in the Professions

Senior Courses

Telecommunication Systems (TDC) 376 Network project
Two 300-level TDC electives to be chosen in consultation with student's advisor.

Open Electives

Nine courses to be chosen in consultation with student's advisor.

Note: PHL/REL/MGT 228 Business, Ethics and Society is a required course which is already credited in the Liberal Studies Program.

Note: Grades for all courses in the students major (i.e. non-Liberal Studies and non-Open Elective) must be “C” or better. Grades of “C-” may be accepted provided the overall grade point average in the major is 2.0 or better.

Bachelor of Arts in Computing

The Bachelor of Arts in Computing is offered jointly by the School of Computer Science, Telecommunications and Information Systems and the School for New Learning. This degree is designed for working adults at least 24 years of age, who wish to obtain credit for their careers as technology professionals, and gain new skills in problem-solving, design, testing and communicating. The BA in Computing differs from the BS in Computer Science in that the BS places heavier emphasis on traditional programming and formal algorithmic analysis. The BA in Computing program focuses on relating program design and computing to organizational dynamics and human relations. It helps to prepare students to analyze and negotiate the social, ethical, and technological systems of a business and to act as a liaison between the technical and non-technical sides of a company.

The computer competences in the BA in Computing program cover a variety of topics directly related to current industry practice. These competences include skills and knowledge in information systems, data communications, databases, software engineering, and the design and evaluation of user interfaces. In the general studies area of the program, competences are tied to the humanities, the natural sciences and the social sciences. Students may select competences in the arts, design, ecology, human biology, multicultural relations, politics and so on that are tailored to their individual goals and interests. The BA in Computing is completed by satisfying a total of fifty (50) competences; this amounts to the equivalent of 140 quarter hours. Typically these competences are satisfied through course work or equivalent work experience.

For a copy of the Program Guide for the Bachelor of Arts in Computing or to make reservations for a BA in Computing Information Session, please call either the School of Computer Science, Telecommunications and Information Systems at (312)362-8381 or the School for New Learning at (312)362-8001.
SPECIAL PROGRAMS

TEACHER OF COMPUTER SCIENCE: SECONDARY LEVEL

In cooperation with the School of Education, the School of Computer Science, Telecommunications and Information Systems (CTI) offers a concentration of study which combines the requirements for a major in Computer Science with certification for teaching computer science at the junior high, middle, and senior high school levels. A student electing such a program should consult the School of Education counselor as soon as possible after entering DePaul.

MINORS

COMPUTER GRAPHICS MINOR

Computer Science (CSC) 211 Programming in Java I
Either GPH 250 Digital Modeling or HCI 310 Introduction to Human-Computer Interaction

COMPUTER SCIENCE MINOR

E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology, 270 Client Side Web Application Development
Computer Science 211 Programming in Java I, 212 Programming in Java II, 319 Database Technology, and either 309 Object Oriented Programming in C++ or 313 Data Structures in Java
Mathematics (MAT) 140 and either 141 Discrete Mathematics II or 150 Calculus I

DATA ANALYSIS MINOR

Computer Science (CSC) 200 Survey of Computer Technology, 211 Programming in Java I, 212 Programming in Java II, 319 Database Technology, 323 Data Analysis and Statistical Software I, 324 Data Analysis and Statistical Software II, and either 328 Data Analysis for Experimenters or 334 Advanced Data Analysis

E-COMMERCE TECHNOLOGY MINOR

Computer Science (CSC) 211 Programming in Java I, 255 Information Structures and Representation
Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction

HUMAN-COMPUTER INTERACTION MINOR

Computer Graphics and Animation (GPH) 211 Perceptual Principles for Digital Environments I
Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction, 312 Analysis and Design for HCI, 360 Evaluating Human Computer Interaction
Psychology (PSY) 105 Introductory Psychology I

INFORMATION SYSTEMS MINOR

Computer Science (CSC) 211 Programming in Java I, 255 Information Structures and Representation, 319 Database Technology
E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology
Human-Computer Interaction (HCI) 310 Introduction to Human-Computer Interaction

NETWORK TECHNOLOGIES MINOR
Computer Science (CSC) 211 Programming in Java I, 212 Programming in Java II
E-Commerce Technology (ECT) 250 Survey of E-Commerce Technology
Telecommunication Systems (TDC) 361 Basic Communication Systems, 362 Principles of Data Communications, 363 Introduction to Local Area Networks
One 300-level CTI course

COURSES
All courses carry 4 quarter hours of credit unless otherwise specified.

CTI/ELA ENGLISH PREPARATION CTI/ELA English Preparation.

CSC 110 ELEMENTS OF COMPUTER AND INFORMATION SCIENCE A general introduction to computer science and information processing. Includes a brief sketch of the history of the field, its impact on society, and a look toward the future. Substantial time will be spent covering the many types of problems which computers can be used to solve. Various systems and software packages are used when available.

CSC 150 INTRODUCTION TO COMPUTER SYSTEMS AND PROGRAMMING An introduction to the necessary techniques and skills required to utilize the University's computer systems. The course will cover the use of an interactive multi-user system and system utilities as well as programming concepts and techniques. Computer problem solving methods will be emphasized. Intended computer science majors should consult a departmental advisor.

CSC 200 SURVEY OF COMPUTER TECHNOLOGY General survey of computer systems starting with information technology and society, extending to cover the technologies used in information processing, what information systems do and the backbone of all information systems - the information itself. Other topics include communications systems, operating systems, programming and programming languages, application software and basic business concepts.

CSC 203 COBOL PROGRAMMING An introduction to programming in the business-oriented language COBOL. The emphasis will be on business problems involving processing large amounts of data. PREREQUISITE(S): 3 years high school mathematics, Mathematics 101 or placement by the Mathematics Diagnostic Test, or equivalent.

CSC 211 PROGRAMMING IN JAVA I Introduction to object-oriented programming using Java. Topics include variables, data types, control structures, arrays, method invocation and parameter passing, predefined classes and programmer-defined classes. Introduction to Java interfaces and inheritance. Simple graphical user interfaces, events, and listeners.

CSC 212 PROGRAMMING IN JAVA II Intermediate object-oriented programming using Java. Implementation of programmer-defined classes including stacks and queues. Java collection classes. Introduction to class diagrams. Exception handling. Simple network programming including applets, JDBC, and URL access. PREREQUISITE(S): CSC 211.
CSC 213  **ON-LINE PROCESSING IN COBOL** Conversational and Pseudiconversational programming in COBOL, including subprogramming. Relative and indexed file organizations supporting on-line access. Concepts of interactive screen design and programming with use of customer information control syst (CICS) and IBM mainframes. **PREREQUISITE(S):** CSC 203.

CSC 215  **INTRODUCTION TO STRUCTURED PROGRAMMING USING C++** An introduction to structured computer programming using ANSI C++. Topics include: simple data types, control structures, character string processing, array processing, functions and structures. COREQUISITE: Mathematics 140. Students must have completed or be concurrently enrolled in Mathematics 140 to register for this course.

CSC 215  **JAVA FOR PROGRAMMERS** Object-oriented programming in Java. Simple graphical user interfaces, events, and listeners. Implementation of programmer-defined classes including stacks and queues. Java collection classes. Introduction to class diagrams. Exception handling. Simple network programming including applets, JDBC, and URL access. **PREREQUISITE(S):** Experience in at least one high-level programming language.

CSC 224  **C++ LANGUAGE FOR PROGRAMMERS** Introduction to the programming language C++ for students with previous programming experience in some high-level language other than C or C++. C++ data types, operators, control flow, functions, arrays, classes, introduction to templates, dynamic storage allocation (new, delete). **PREREQUISITE(S):** At least one quarter of a high-level computer language.

CSC 225  **PERSONAL COMPUTING** An intermediate-level course in the use of personal computers for scientific and social research and business applications. Development and analysis of relational databases, reports, queries, SQL. Basic and advanced uses of spreadsheets for data analysis and modeling. Visualization methods for complex data sets. Symbolic computation tools. **PREREQUISITE(S):** Students are assumed to be familiar with Windows. MAT 130 or equivalent.

CSC 239  **PERSONAL COMPUTING FOR PROGRAMMERS** Introduction to relational database concepts using PC databases; data access methods; structured query language (SQL); query by example; networks and the use of networks to share data; spreadsheets and macro languages.

CSC 240  **COMPUTERS AND HUMAN INTELLIGENCE** Students taking this course will study human problem-solving and its simulation by computers. Artificial intelligence, pattern recognition and learning programs will be discussed. **PREREQUISITE(S):** One of the following: CSC 110, MIS 130 or previous acquaintance with a programming language.

CSC 255  **INFORMATION STRUCTURES & REPRESENTATIONS** Data representation, machine architecture concepts, algorithms, data structures including arrays, stacks, linked lists, trees.

CSC 303  **THE IBM MAINFRAME ENVIRONMENT** Concepts and use of IBM mainframe features including job control language (JCL), Virtual Storage Access Method (IDCAMS) utility functions, and the CLIST and REXX programming languages to manage disk file allocation and usage, control printing functions, support magnetic tape processing, and disk data set management and reporting software. **PREREQUISITE(S):** CSC 213.

CSC 307  **TOPICS IN COMPUTER SCIENCE** **PREREQUISITE(S):** Consent.
CSC 309 OBJECT-ORIENTED PROGRAMMING IN C++ The essentials of C and C++ programming, focusing primarily on the topics of memory management and data structures such as linked lists and trees. Recursion, inheritance, virtual functions, overloaded operators, templates. **PREREQUISITE(S):** CSC 212 or CSC 224.

CSC 310 PRINCIPLES OF COMPUTER SCIENCE I Conceptual models of a computer, machine and assembly language. Simple classes, operator overloading, templates, recursion, dynamic memory management. **PREREQUISITE(S):** CSC 215 or consent.

CSC 311 PRINCIPLES OF COMPUTER SCIENCE II Basic data structures, stacks, queues, linked lists. Trees, tree searches and string processing, recursion, sorting, searching, inheritance in C++. **PREREQUISITE(S):** CSC 310.

CSC 312 ASSEMBLY LANGUAGE AND COMPUTER ORGANIZATION Data presentation, addressing schemes and instructions for assembly language. Introduction to computer organization. **PREREQUISITE(S):** CSC 309 or CSC 313, or CSC 311

CSC 313 DATA STRUCTURES IN JAVA Data structures in Java and their implementations in Java collection classes, including linked lists, and trees. User-defined class hierarchies and interfaces. Sorting, analysis of algorithms, and recursion. **PREREQUISITE(S):** CSC 212 and MAT 140.

CSC 318 WINDOWS PROGRAMMING IN C++ Programming for event-driven, graphical user interface applications using C++, basics of object-oriented programming, event handling, resources, user interface design, database programming, multiple document interfaces. **PREREQUISITE(S):** CSC 309, or CSC 311

CSC 319 DATABASE TECHNOLOGY Mainframe and PC database technology; open database connection using the ODBC model; Oracle and DB2; enterprise models and entity relationship models; normalization; object database models; distributed databases. **PREREQUISITE(S):** CSC 309 or CSC 311

CSC 321 DESIGN AND ANALYSIS OF ALGORITHMS Techniques for designing algorithms including: analyzing algorithms (big-O, recurrence relations, profilers) and divide-and-conquer (quicksort, mergesort). Additional topics chosen from: the greedy method, dynamic programming, backtracking, branch-and-bound and string matching. **PREREQUISITE(S):** MAT 140 and CSC 313.

CSC 323 DATA ANALYSIS AND STATISTICAL SOFTWARE I Computing with the statistical package SAS. Introduction to data analysis, elementary statistical inference. Regression and correlation. **PREREQUISITE(S):** MAT 130 or BMS 125.

CSC 324 DATA ANALYSIS & STATISTICAL SOFTWARE II Continuation of 323. Multiple regression and correlation, residual analysis, analysis of variance, and robustness. **PREREQUISITE(S):** CSC 323.

CSC 325 ADVANCED TOPICS IN C AND UNIX Advanced features of C language: self-referential structures, fields and unions, dynamic memory allocation, command-line arguments, compiler control lines. Introduction to C compiler. UNIX operating system: I/O system, file and directory structures, Command Shell and other system facilities and utilities. The student will design and implement some projects in C under the UNIX operating system environment. **PREREQUISITE(S):** CSC 309.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisites</th>
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<tbody>
<tr>
<td>CSC 326</td>
<td>COMPUTERS, ETHICS AND SOCIETY</td>
<td>This course examines the impact of computerized technologies on society with particular attention to the ethical issues raised by these social effects. As such, the course is interdisciplinary in character. It uses the methods of historical and sociological analysis as well as methods of moral reasoning grounded in philosophical principles and both secular and religious world-views to study technological changes. Particular attention will be paid to the question of the social responsibilities of professionals and we will examine the ACM’s code of professional ethics. <strong>Prerequisite(s):</strong> Junior standing.</td>
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<tr>
<td>CSC 328</td>
<td>DATA ANALYSIS FOR EXPERIMENTERS</td>
<td>The use of statistical software in conducting an analysis of variance in a variety of settings and the interpretation of generated results. Analysis of variance for completely randomized, randomized block, and Latin square designs; for factorial experiments; for incomplete block designs; with missing data; for fixed-effects, random-effects, and mixed-effects models; and for experiments with repeated measures. The analysis of covariance. <strong>Prerequisite(s):</strong> CSC 324.</td>
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</tr>
<tr>
<td>CSC 332</td>
<td>SIMULATION AND MODELING</td>
<td>Measurement and tuning of computer systems. Simulation and analytical models. Operational analysis and queuing theory. <strong>Prerequisite(s):</strong> CSC 323 or MAT 145.</td>
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<tr>
<td>CSC 334</td>
<td>ADVANCED DATA ANALYSIS</td>
<td>Topics chosen from among multivariate statistical methods, discriminate analysis, principal components, factor analysis, discrete multivariate analysis, time series and non-parametric statistics. <strong>Prerequisite(s):</strong> CSC 324 or consent.</td>
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<tr>
<td>CSC 336</td>
<td>VISUAL BASIC FOR PROGRAMMERS</td>
<td>An accelerated introduction to Visual Basic. Topics include: intrinsic controls, event driven programming, variables, control flow, arrays, collections, database programming, user defined classes, ActiveX controls. <strong>Prerequisite(s):</strong> CSC 212 or CSC 224.</td>
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<tr>
<td>CSC 340</td>
<td>TEACHING COMPUTER SCIENCE</td>
<td>A study of different programming languages used in high schools: PASCAL, BASIC, LOGO etc. A survey of computer topics covered in high school courses. Motivation and objectives in computer education. <strong>Prerequisite(s):</strong> CSC 313.</td>
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</tr>
<tr>
<td>CSC 342</td>
<td>FILE PROCESSING AND DATA MANAGEMENT</td>
<td>File processing environment and file manipulation techniques. Algorithms and techniques for implementing stream files, sequential files, direct files, indexed sequential files. Inverted lists, multi-lists, and database structures will be discussed. Implementation of data management systems. <strong>Prerequisite(s):</strong> CSC 212.</td>
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</tr>
<tr>
<td>CSC 343</td>
<td>INTRODUCTION TO OPERATING SYSTEMS</td>
<td>A brief history of operating systems development; the four basic components-file systems, processor scheduling; memory management, and device scheduling; deadlock; concurrency; protection; distributed systems. <strong>Prerequisite(s):</strong> CSC 309.</td>
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<tr>
<td>CSC 345</td>
<td>COMPUTER ARCHITECTURE</td>
<td>Introduction to digital logic; micro-programming; further topics. <strong>Prerequisite(s):</strong> CSC 312.</td>
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<tr>
<td>CSC 347</td>
<td>CONCEPTS OF PROGRAMMING LANGUAGES</td>
<td>A comparative study of computer languages. Formal methods of language definition. Control structures and data flow. The effects of the run-time environment and binding time on various features of languages. Interpretive languages. Lexical analysis and parsing. <strong>Prerequisite(s):</strong> CSC 313, or CSC 311.</td>
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</table>
CSC 348 INTRODUCTION TO COMPILER DESIGN An overview of the design of a compiler for a general purpose programming language; tools for designing the components of the compiler; implementing the compiler; run time environments. PREREQUISITE(S): CSC 347.

CSC 351 DATABASE DESIGN Design methodologies. Requirement formulation and analysis, conceptual design, implementation design, physical design. Emphasis will be on data modeling techniques. Class team projects include the design of a complete database structure and implementations of design tools. PREREQUISITE(S): CSC 319.

CSC 352 DATABASE PROGRAMMING Programming in large-scale relational database environment using host languages such as C. Design and implementation of online applications and report generations. Microcomputer Database System programming. Concepts such as database integrity, transactions, transaction recovery, concurrency and record locking will be covered. PREREQUISITE(S): CSC 212 and CSC 319.

CSC 355 SOPHOMORE HONORS SEMINAR Sophomore honors seminar.

CSC 356 JUNIOR HONORS SEMINAR Junior honors seminar.

CSC 357 EXPERT SYSTEMS A detailed study of the development of artificial intelligence-based expert systems applications. Students will use commercial expert systems packages to develop example applications programs. Topics will include and other knowledge representation techniques, rule-based and case-based systems, inference, and model-based reasoning. PREREQUISITE(S): CSC 212.

CSC 358 SYMBOLIC PROGRAMMING Introduces the basic concepts of symbolic programming as embodied in the language LISP. Basic data and control structures of LISP: symbolic expressions, the interpreter, functions, recursion, iteration. Advanced data and control structures. Making language extensions. How symbolic programming leads to new techniques of procedural and data abstraction. PREREQUISITE(S): CSC 212.

CSC 359 CLIENT/SERVER STRATEGIES Using local area networks, distributed databases and graphical user interfaces to develop and support client/server applications; migration from mainframe legacy systems to client/server and data warehouses; decision support systems; process and business re-engineering. PREREQUISITE(S): CSC 336.


CSC 378 SOFTWARE PROJECTS FOR COMMUNITY CLIENTS PREREQUISITE(S): Instructor Permission (JR: Service).

CSC 380 ARTIFICIAL INTELLIGENCE (Cross-listed: 480) PREREQUISITE(S): CSC 313 or CSC 311 or consent.
CSC 382  LEGAL ASPECTS OF DATA PROCESSING A practical survey of computer and data processing law arising in a high-tech environment. Areas covered included: Contracts, Copyrights, Patients, Trade Secrets, Trademarks, Crime, Unfair Competition and International Treaties.


CSC 387  OPERATIONS RESEARCH I: LINEAR PROGRAMMING The Linear Programming problem and its dual; the simplex method; transportation and warehouse problems; computer algorithms and applications to various fields. PREREQUISITE(S): MAT 220 and any introductory programming course.

CSC 388  OPERATIONS RESEARCH II: OPTIMIZATION THEORY Integer programming; non-linear programming; dynamic programming; queuing theory; game theory. PREREQUISITE(S): CSC 387.

CSC 389  THEORY OF COMPUTATION PREREQUISITE(S): 350 or consent.

CSC 395  COMPUTER LOGIC DESIGN (Cross-listed as CSC 495) PREREQUISITE(S): CSC 345 or consent.

CSC 396  MICROPROCESSORS An introduction to the hardware and software aspects of microprocessors. Digital electronics, microprocessors, programming, interfacing. Laboratory work will involve hands-on work with microprocessor systems. PREREQUISITE(S): CSC 312 or consent of instructor.

CSC 398  INTERNSHIP In cooperation with local employers the computer science program offers students the opportunity to integrate their academic experience with on-the-job training in computer related work areas. Academic credit is variable and admission to the program requires consent of internship advisor.

CSC 399  INDEPENDENT STUDY Variable credit. PREREQUISITE(S): Consent of dean.

ECT 250  SURVEY OF E-COMMERCE TECHNOLOGY An introduction of Internet technology and its applications for electronic commerce. Survey of how Internet works, the TCP/IP protocol, services available on the Internet, the concepts of WWW, clients and servers, Web browsers, search engines, intelligent agents, HTML authorizing tools, and audio video communications. Components of e-commerce, including digital payment, catalogue, data exchange, security. The application of e-commerce technology for organizations, business, and industries.

ECT 270  CLIENT SIDE WEB APPLICATION DEVELOPMENT This course presents a comprehensive study of HTML, Cascading Style Sheets, JavaScript and XML. Students will create their own complex Web site as well as a Business to Consumer (B2C) site and program in XML for data sharing in a Business to Business (B2B) environment. PREREQUISITE(S): ECT 250, or CSC 200.
ECT 341  **USABILITY ISSUES FOR ELECTRONIC COMMERCE** (Cross-listed with HCI 341)  Design, prototyping and evaluation of e-commerce web sites. Context of usability in the project development life cycle. User/task analysis with emphasis on the first time and the infrequent user. Content organization. User testing with low fidelity prototypes. Aesthetics and appeal. Students' projects involve design and/or evaluation of actual electronic commerce sites. **PREREQUISITE(S):** HCI 310.

ECT 353  **SERVER SIDE WEB APPLICATION DEVELOPMENT** Formerly IS 353. Application development for e-commerce. Includes development of small-scale e-commerce transaction applications. Students will design and build a retail Web site that accesses a database for online order processing. **PREREQUISITE(S):** ECT 270 and CSC 212 or CSC 336.

ECT 355  **E-COMMERCE APPLICATION MODELS** (Formerly IS 355) This course examines the application of Internet technology to support consumer-oriented e-commerce, enterprise e-business solutions, and emerging business-to-business trading models. The focus will be on models for online retail, consumer behaviors, shopping portals, shopping cart design, personalization, interactive marketing and related technologies. Students will study different models for e-commerce applications and develop applications to support catalogue, shopping cart, and order fulfillment processes. **PREREQUISITE(S):** ECT 353.

ECT 356  **ADVANCED SERVER SIDE PROGRAMMING** Advanced concepts of planning, building and maintaining business Web sites using server-side scripting. Emphasis on database access and updating, Creating Active Server Components. Controlling security. A hands-on course requiring prior server-side scripting experience. **PREREQUISITE(S):** ECT 353.

ECT 357  **MOBILE COMMERCE** Introduction to the wireless technology and its application for mobile commerce. A survey of wireless Internet, standards, platforms, wireless data services, location based technology, security, privacy, pricing and payment systems. Selection of mobile commerce services, the wireless application development, interface design, and content management. Students will participate in group projects. **PREREQUISITE(S):** ECT 355.

ECT 359  **E-COMMERCE TECHNOLOGY SENIOR PROJECT** Students will build complex web information systems using both client-side and server-side technology. Project teams will apply web engineering methodology to produce the final project with deliverables including strategy and requirement statement, site information architecture, interface design, prototyping, testing, promotion and measurement, feasibility study, and final presentation of team project. **PREREQUISITE(S):** ECT 353, ECT 355, and IS 315.

ECT 372  **SOFTWARE PROJECT DEVELOPMENT AND MANAGEMENT** (Cross-listed with IS 372) In-depth study of the development and implementation process for both traditional and e-commerce software projects of all sizes. Project structuring, tools and techniques for scheduling and control, including project management software. Emphasis upon working within an organizational context. **PREREQUISITE(S):** IS 315.

ECT 390  **TOPICS IN E-COMMERCE TECHNOLOGY** May be repeated for credit. **PREREQUISITE(S):** Either ECT 353 and ECT 355 or consent of instructor.
<table>
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<tr>
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<tbody>
<tr>
<td>GPH 211</td>
<td><strong>PERCEPTUAL PRINCIPLES FOR DIGITAL ENVIRONMENTS I</strong></td>
<td>An introduction to the visual, non-verbal principles incorporated in the effective presentation of on-screen environments. This course emphasizes the use of two-dimensional elements and their organization.</td>
</tr>
<tr>
<td>GPH 212</td>
<td><strong>PERCEPTUAL PRINCIPLES FOR DIGITAL ENVIRONMENTS II</strong></td>
<td>Further experience with the visual, non-verbal principles incorporated in effective presentation of on-screen environments. This course emphasizes the use of three-dimensional elements, spaces and their organization.</td>
</tr>
<tr>
<td>GPH 250</td>
<td><strong>DIGITAL MODELING I</strong></td>
<td>Introduction to 3D object modeling with an emphasis on visual applications and prototype design. Students will work with basic spatial operations in surface modeling and CAD interfaces and will produce an original object from pattern with computer-aided manufacture.</td>
</tr>
<tr>
<td>GPH 259</td>
<td><strong>DESIGN GEOMETRY (Cross-listed with ART 295)</strong></td>
<td>An historical and practical introduction to the visual applications of geometry. This CAD-based survey covers constructive geometry, surface symmetry, projective geometry, polyhedrons and spheroids through the discussion of historical precedents and practicum exercises.</td>
</tr>
<tr>
<td>GPH 329</td>
<td><strong>COMPUTER GRAPHICS DEVELOPMENT (Formerly CSC 329)</strong></td>
<td>Basic graphics architecture. Coordinate systems. Three-dimensional representations and transformations. Simple visible-surface algorithms. Introduction to illumination. Gouraud and Phong shading. Antialiasing. Texture mapping and elements of animation. Students create a graphics package using a high-level graphics API such as OpenGL.</td>
</tr>
<tr>
<td>GPH 338</td>
<td><strong>COMPUTER ANIMATION SURVEY (Formerly CSC 338)</strong></td>
<td>Survey of methods used in computer animation. This course uses commercially available software packages to teach techniques for animation and digital video production. The techniques covered include storyboarding, key frame animation, audio and video editing.</td>
</tr>
<tr>
<td>GPH 350</td>
<td><strong>DIGITAL MODELING II</strong></td>
<td>Advanced experience in object modeling and prototype design. Students will work with more sophisticated form relationships, reverse engineering and textures, and will produce an original object from slicing with computer-aided manufacture.</td>
</tr>
<tr>
<td>GPH 360</td>
<td><strong>MODELING SPACES</strong></td>
<td>The digital design and modeling of environmental spaces with attention to human use parameters.</td>
</tr>
<tr>
<td>GPH 371</td>
<td><strong>SURVEY OF COMPUTER GRAPHICS (Formerly CSC 371)</strong></td>
<td>Overview of selected 2D techniques including composing, and morphing, and a survey of basic 3D techniques, including interaction of light and color. Students write parts of a ray tracer, and create an animation.</td>
</tr>
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</table>
GPH 372  PRINCIPLES OF COMPUTER ANIMATION (Formerly CSC 372)  This course will cover a range of topics in introductory 3D Computer Animation. Topics covered will include key framing, interpolation, hierarchies, inverse kinematics, particle systems, and the basics of physically based simulation and modeling. PREREQUISITE(S): GPH 329 and MAT 151.

GPH 374  COMPUTER GAMES (Formerly CSC 374) (Cross-listed with CSC 574)  Concept and character development, storyboarding, prototyping, testing and implementation. Interaction techniques. Optimization of lighting and texturing. Discussion of relevant hardware and Peripherals. PREREQUISITE(S): GPH 329

GPH 375  ADVANCED GRAPHICS DEVELOPMENT (Formerly CSC 375)  Survey of standards and current modular technology for 2D and 3D graphics software development. Use of software development toolkits to create "plug-ins" and other modularly organized functionality enhancements for selected commercially available graphics packages. PREREQUISITE(S): GPH 329 or permission of instructor.

GPH 395  COMPUTER GRAPHICS SENIOR PROJECT  A group project involving analysis, design, creation, implementation and testing of a large project such as an animation, an interactive multimedia presentation or a video game. Portfolio creation and critique. Discussion of strategies for graduate school and the job market. PREREQUISITE(S): GPH 338 or GPH 372.

HCI 201  MULTIMEDIA AND THE WORLD WIDE WEB  Overview of the Web, its origins and capabilities. Students will create homepages on the Web. Topics include Web-based technology, creating content for distribution on the Web and basic design concepts. Students will learn to evaluate Web sites based on a variety of criteria. PREREQUISITE(S): Computer literacy or CSC 110 or CSC 150 or consent of instructor.

HCI 270  FORMATTING DIGITAL PAGES I  Introduction to the perceptual and communication principles for developing effective on-line and off-screen pages. Includes experience with standard vector-based visual software. PREREQUISITE(S): ART 105 or GPH 211.

HCI 271  FORMATTING DIGITAL PAGES II  This course builds on HCI 270 with problem-based application of perceptual and communication principles in developing effective multi-page screen environments. Includes experience with more sophisticated visual software. PREREQUISITE(S): HCI 270.

HCI 310  INTRODUCTION TO HUMAN-COMPUTER INTERACTION  The user interface development process, including user and task analysis, design, prototyping and evaluation. Human memory, perception, and motor abilities as they relate to user interface design. Students design a low-tech prototype of a user interface. Students prepare written documents describing their activities and present the final results to the class. PREREQUISITE(S): Sophomore standing.

HCI 312  ANALYSIS AND DESIGN FOR HCI (Formerly HCI 300)  User and task analyses that emphasize an early focus on users and their environment. Stresses methods that lead to successful communication and teamwork. PREREQUISITE(S): HCI 310.

HCI 315  THEORY AND PERCEPTION OF COLOR  A problem-based course introducing additive and subtractive colors systems and their technology. It explores the perceptual phenomena of color relationships and their applications in digital environments. PREREQUISITE(S): HCI 310 or GPH 371.
HCI 322  **MULTIMEDIA** Underlying technological issues including synchronization and coordination of multiple medias, file formats for images, animations, sound, and text. Hypertext. Information organization. Survey of multimedia authoring software. Long distance multimedia (World Wide Web). Students will critique existing applications and create several multimedia applications. Students present their final results to the class. **PREREQUISITE(S):** CSC 211 or HCI 310.

HCI 332  **USER-CENTERED WEB DEVELOPMENT** (Credit hour range 4-4.5) Analysis, design, and development of interactive web sites. Evaluation of web interaction techniques and customization in terms of user-centered design and appropriateness of application. Survey of commercially available development tools. Production and preparation of multimedia elements for web distribution. **PREREQUISITE(S):** HCI 201 or HCI 310.

HCI 341  **USABILITY ISSUES FOR ELECTRONIC COMMERCE** (Cross Listed with ECT 34) Design, prototyping and evaluation of e-commerce web sites. Context of usability in the project development life cycle. User/task analysis with emphasis on the first time and the infrequent user. Content organization. User testing with low fidelity prototypes. Aesthetics and appeal. Students’ projects involve design and/or evaluation of actual electronic commerce sites. **PREREQUISITE(S):** ART 105 and HCI 310.

HCI 350  **USABILITY IN COMPUTING SYSTEMS** Application of psychological theory to the design of computer systems, with emphasis on web sites. Overview of applicable research methods. Sensation, cognition, decision making, Display and control design. Overview of workspace design including biomechanics, work physiology, stress and workload. **PREREQUISITE(S):** HCI 310.

HCI 360  **EVALUATING HUMAN-COMPUTER INTERACTION** Introduces students to a variety of evaluation techniques that can be applied to user interfaces. Techniques include heuristic evaluations, cognitive walkthroughs, think-aloud evaluations, pluralistic walkthroughs, user testing and controlled experiments. Students evaluate existing systems using several of these techniques. Students present their final results to the class. **PREREQUISITE(S):** HCI 310 and CSC 323.

HCI 390  **TOPICS IN HUMAN-COMPUTER INTERACTION** **PREREQUISITE(S):** Completion of the HCI core courses or consent of the instructor. May be repeated for credit.

HCI 399  **INDEPENDENT STUDY** Independent study.

IPD 377  **EXECUTIVE STAFF PERSONAL COMPUTING PROGRAM** Executive staff personal computing program.

IPD 378  **EXECUTIVE PERSONAL COMPUTING PROGRAM** Executive Personal Computing Program (program Discontinued June, 1997).

IPD 379  **CLIENT/SERVER TECHNOLOGY PROGRAM** Client/Server Technology Program (program Discontinued April, 1997).

IPD 382  **JAVA DEVELOPER PROGRAM** A Ten-Week Comprehensive Certificate Program Covering Object-Oriented Applications Development Using Java For Programmers. Program Offered Through The Institute For Professional Development; Enrollment Is Restricted.

IPD 383  **VISUAL C++ PROGRAM** An eleven-week accelerated program covering object-oriented Windows 95 software development using Visual C++. Program offered through the Institute for Professional Development; enrollment is restricted.
IPD 384  **WINDOWS SOFTWARE DEVELOPMENT PROGRAM**  An eleven-week intensive certificate program in the fundamentals of MS Windows and client/server technology for programmers. Program offered through the Institute for Professional Development; enrollment is restricted.

IPD 385  **WEB DEVELOPER PROGRAM**  A ten-week in-depth program covering the technologies and techniques of Web development for systems professionals. Program offered through the Institute for Professional Development; enrollment is restricted.

IPD 386  **WEB DESIGNER PROGRAM**  A ten-week intensive program covering the technologies and techniques of Web design and production. Program offered through the Institute for Professional Development; enrollment is restricted.

IPD 387  **WEB COMMERCE PROGRAM**  A ten-week comprehensive program covering emerging E-Commerce technologies and strategies. Program is offered through the Institute for Professional Development; enrollment is restricted.

IPD 391  **DB2 PROGRAM**  DB2 Program (program Discontinued Autumn, 1995).

IPD 392  **TELECOMMUNICATIONS PROGRAM**  A twelve-week integrated certificate program in telecommunications technology, systems and management. Program offered through the Institute for Professional Development; enrollment is restricted.

IPD 393  **LOCAL AREA NETWORKS PROGRAM**  A twelve-week intensive certificate program in the fundamentals of local area networks, wide area networks and data communications for LAN managers and data processing professionals. Program offered through the Institute for Professional Development; enrollment is restricted.

IPD 397  **COMPUTER CAREER PROGRAM**  A thirty-week accelerated certificate program designed for those considering a change into the computer field. Program offered through the Institute for Professional Development; enrollment is restricted.

IS 313  **BUSINESS APPLICATION DEVELOPMENT IN JAVA**  This course covers the design and implementation of several key business applications, for example, Customer Invoice and Cash Receipts, Accounts Receivable, Finished Goods and Payroll. These topics will motivate the use of advanced techniques in the Java programming language with an emphasis upon database usage and business reporting. **PREREQUISITE(S):** CSC 212 or CSC 224.

IS 315  **ANALYSIS AND DESIGN TECHNIQUES**  This course presents a practical approach to modern techniques and tools for systems analysis and design. The focus is on the phases of systems development life cycle (SDLC) and approaches to rapid application development. Students will acquire an in-depth knowledge about process and data modeling, DFD, ERD, data dictionary, and prototyping. Case studies and team projects will facilitate critical-thinking and creative project solutions. **PREREQUISITE(S):** Junior Standing, HCI 310 and CSC 319.

IS 370  **COMPUTER INFORMATION SYSTEMS**  This course emphasizes the study of information system support for financial accounting, managerial accounting, fundamentals of management, production and operations management. Survey of business, accounting, marketing and management concepts relevant to information systems professionals. **PREREQUISITE(S):** IS 315.
IS 371  INTRODUCTION TO I.T. MANAGEMENT  This course focuses on implementation and post-implementation support for information systems. Topics include testing, deployment, user training, help desk, software upgrades, and staffing for support teams. Case studies and team projects. PREREQUISITE(S): IS 315.

IS 372  FUNDAMENTALS OF SOFTWARE PROJECT MANAGEMENT  An introduction to the concept and techniques of project management for a broad range of systems, including Web-based application development. Topics include resource management, organizational factors, project manager responsibilities, team building, and risk management. Tools and techniques for project estimating and scheduling will be presented. Case study and group projects. PREREQUISITE(S): IS 315.

IS 373  INTRODUCTION TO LARGE SYSTEMS IMPLEMENTATION  An introduction to the implementation of complex package solutions for enterprise computing in a client-server environment. Functionalities and purposes of package solutions, such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM). Business process framework, architecture, implementation tools and methodology, system integration, change management, and package selection. PREREQUISITE(S): IS 315.

IS 374  MANAGEMENT SUPPORT SYSTEMS  This course provides an understanding of software support for organizational decision making. Topics include: analysis, design and implementation of systems for decision support and strategic planning, including decision support systems (DSS), group decision support systems (GDSS), and enterprise decision support systems (EDSS), data warehousing, data mining and neural computing, and intelligent agents. Case studies, projects on applications, and evaluation of software. PREREQUISITE(S): IS 315.

IS 375  OBJECT-ORIENTED ANALYSIS AND DESIGN  This course focuses on object-oriented modeling techniques for analysis and design. Emphasis will be on the creation of well-designed, robust and maintainable software systems. UML (Unified Modeling Language) will be examined for modeling the system. Case studies will promote critical-thinking skills as well as provide the foundation for a student project that incorporates the skills attained throughout the quarter. PREREQUISITE(S): IS 315 and IS 371.

IS 376  INFORMATION SYSTEMS PROJECT  This senior project course requires students to apply prior learning in project management and systems development life cycle by developing a complete systems from business case, analysis, design, through implementation strategies. Team project, documentation, presentation, the use of development as well as project management tools will be emphasized. PREREQUISITE(S): IS 313, IS 370, IS 371, IS 372 and Senior standing.

TDC 311  COMPUTERS IN TELECOMMUNICATIONS SYSTEMS  An introduction to computer organizations and operating systems. Computer components and functions, logic circuits, internal processing, multiprogramming, timesharing, management, file management, interrupts and I/O peripheral devices. PREREQUISITE(S): CSC 211 or CSC 255.

TDC 361  BASIC COMMUNICATION SYSTEMS  Introduction to voice networks; data communications fundamentals; local area networks, Internet technologies. PREREQUISITE(S): CSC 211 or CSC 255.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>TDC 362</td>
<td><strong>PRINCIPLES OF DATA COMMUNICATIONS</strong></td>
<td>Theory and components of data communication systems, modes, codes, and error detection techniques for data transmission, network protocols and line control procedures, communication carrier facilities and system planning.</td>
<td>TDC 361</td>
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<tr>
<td>TDC 363</td>
<td><strong>INTRODUCTION TO LOCAL AREA NETWORKS</strong></td>
<td>LAN topologies, media and interconnection methods. Issues in communications protocols and compatibility. Client-server versus peer-peer software applications. Network operating system services and management of local networks.</td>
<td>TDC 361</td>
</tr>
<tr>
<td>TDC 364</td>
<td><strong>VOICE COMMUNICATIONS TECHNOLOGIES</strong></td>
<td>A detailed study of transmission, signaling and switching systems for facilities-based public and private voice networks. Voice digitization and transmission over circuit-switched and packet-switched infrastructures. Computer telephony integration techniques. Quality of service issues in integrated voice-over-data systems.</td>
<td>TDC 361 and TDC 362</td>
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<tr>
<td>TDC 365</td>
<td><strong>NETWORK INTERCONNECTION TECHNOLOGIES</strong></td>
<td>A comprehensive study of network interconnection technologies including layer 2 bridges and switches, layer 3 routers and higher-layer gateways. The TCP and IP protocols will be studied in detail, including IP address management and router operations and management along with associated Internet protocols. RIP and OSPF protocols will be considered. Course includes laboratory work with router administration.</td>
<td>TDC 361 and TDC 362</td>
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<tr>
<td>TDC 368</td>
<td><strong>NETWORK PROGRAMMING</strong></td>
<td>Programming distributed client/server applications; the sockets interface and multitasking issues; client/server models; remote procedure call; examples of applications such as electronic mail and file transfer.</td>
<td>TDC 361 and CSC 309</td>
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<tr>
<td>TDC 369</td>
<td><strong>NETWORK PERFORMANCE ANALYSIS AND DESIGN</strong></td>
<td>Quantitative foundations of network performance analysis. Probability theory and queuing theory will be developed and applied to problems in LAN performance, traffic engineering, and the analysis of throughput and response time measures for data communications networks. Performance tradeoffs in network design.</td>
<td>TDC 363, TDC 365, TDC 365, and MAT 145 or MAT 151</td>
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<td>TDC 372</td>
<td><strong>DIGITAL ACCESS SERVICES</strong></td>
<td>A survey of access line technologies used to access Internet and other business network services. Topics will include traditional DS1, DS3 and SONET transport as well as Integrated Services Digital Network (ISDN), Digital Subscriber Line (DSL), Cable Modems, satellite services. Asynchronous Transfer Mode (ATM), and wireless data access methods.</td>
<td>TDC 362</td>
</tr>
<tr>
<td>TDC 375</td>
<td><strong>NETWORK PROTOCOLS</strong></td>
<td>Advanced routing technologies, BGP protocols, multi-area routing protocols, network management protocols, Secure protocols, IP multicasting protocols.</td>
<td>TDC 365</td>
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<td>Course Code</td>
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<td>TDC 376</td>
<td>NETWORK PROJECT</td>
<td>Case study in developing a large network project. Students will work in groups to analyze and</td>
<td>TDC 365</td>
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<td>design a major network system.</td>
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<td>TDC 390</td>
<td>TOPICS IN NETWORK TECHNOLOGY</td>
<td>Completion of TDC 363 and TDC 365 or consent of the instructor. May be repeated for credit.</td>
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<tr>
<td>TDC 399</td>
<td>INDEPENDENT STUDY</td>
<td>Independent study for variable credit.</td>
<td>Requires approval of faculty advisor and consent</td>
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