SCHOOL OF
COMPUTER SCIENCE,
TELECOMMUNICATIONS
AND INFORMATION
SYSTEMS
GRADUATE PROGRAMS

1997-1998
CAMPUS MAP

SCHOOL OF COMPUTER SCIENCE, TELECOMMUNICATIONS AND INFORMATION SYSTEMS
Philosophy .................................................. 7
Faculty .......................................................... 7
Purposes .......................................................... 8
Facilities .......................................................... 9
Master of Science in Computer Science ....... 10
Master of Science in Distributed Systems ....... 16
Master of Science in Human-Computer Interaction ................................................. 18
Master of Science in Information Systems .... 20
Master of Science in Software Engineering .... 23
Master of Science in Telecommunication Systems .................................................. 27
Master of Science in Management Information Systems ............................................. 31
Doctor of Philosophy in Computer Science ...... 35
Course Descriptions ............................................. 42

THE UNIVERSITY
Campuses ...................................................... 71
Libraries .......................................................... 71
Academic Computing Facilities ....................... 73
Career Development Center .......................... 73
Residence Life .................................................. 74
Accreditation .................................................. 74
Honor Societies ................................................. 75
Board of Trustees ............................................. 76
General Administration ..................................... 76

ACADEMIC INFORMATION AND REGULATIONS
Admission Classifications ................................ 77
Admission Procedures ....................................... 78
Master’s Program Requirements ....................... 79
Doctoral Program Requirement ......................... 80
Student Responsibility .................................... 82
Academic Counseling ...................................... 82
Courses and Credit .......................................... 82
Grades .......................................................... 83
Probation and Dismissal .................................. 84
Plagiarism ...................................................... 84
Registration Procedures .................................. 85
Graduation Procedures ..................................... 85
Commencement ............................................... 85

FINANCIAL POLICIES AND PROCEDURES
Tuition and Fees .............................................. 86
Payment Policies .............................................. 87
Financial Assistance ....................................... 88
Alternative Financing ..................................... 89
Employment Opportunities ............................ 91

CALENDAR
1997-98 Graduate Academic Calendar ............. 92

STATEMENT OF VINCENTIAN CHARACTER

Note: The University reserves the right to revise its Bulletins and Schedules. See page 82 for further details.
DEPAUL UNIVERSITY BULLETIN

SCHOOL OF COMPUTER SCIENCE,

TELECOMMUNICATIONS AND

INFORMATION SYSTEMS

GRADUATE PROGRAMS

MASTER OF SCIENCE IN COMPUTER SCIENCE

MASTER OF SCIENCE IN DISTRIBUTED SYSTEMS

MASTER OF SCIENCE IN HUMAN-COMPUTER INTERACTION

MASTER OF SCIENCE IN INFORMATION SYSTEMS

MASTER OF SCIENCE IN SOFTWARE ENGINEERING

MASTER OF SCIENCE IN TELECOMMUNICATIONS SYSTEMS

JOINT – M.S./M.I.S.

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

To obtain a Bulletin for the Kellstadt Graduate School of Business call (312) 362-8810, for the College of Law call (312) 362-8701, or for Graduate Programs call (312) 362-5367.

DePaul University Bulletin (USPS = 154-260), No. 5, July 1, 1997. Published monthly, March through July, five times per year by DePaul University, 1 East Jackson Boulevard, Chicago, Illinois, 60604. Periodicals postage paid at Chicago, Illinois. POSTMASTER: Send address changes to DePaul University Bulletin, 1 East Jackson Boulevard, Chicago, Illinois 60604.

DePaul University does not discriminate on the basis of race, color, national origin, religion, gender, sexual orientation, age, or handicap in admissions, employment, or the provision of services. Inquiries regarding this policy should be addressed to the Director of Human Resources, DePaul University, 25 E. Jackson Boulevard, Chicago, Illinois 60604.

Editor: Gwyn Friend
ADMINISTRATION

Helmut Epp, Ph.D.
Dean

David P. Miller, Ph.D.
Associate Dean

Anne B. Morley
Director, Student Services

PHILOSOPHY

FACULTY

PURPOSES

FACILITIES

PROGRAMS

Master of Science
Computer Science
Distributed Systems
Human-Computer Interaction
Information Systems
Software Engineering
Telecommunication Systems
Management Information Systems

Doctor of Philosophy
Computer Science

COURSES
SCHOOL OF COMPUTER SCIENCE,
TELECOMMUNICATIONS AND INFORMATION SYSTEMS

PHILOSOPHY

DePaul University, founded on Judeo-Christian principles, continues to assert the relevance of these principles through higher education to modern man and woman. The University expresses these principles especially by passing on the heritage of St. Vincent de Paul: individual perfection manifested through purposeful involvement with other persons, communities and institutions.

The School of Computer Science, Telecommunications and Information Systems assumes as its direct educational task to foster in its students those traditions of scholarliness central to advanced studies and research. The programs for the master's and doctoral degrees are designed to develop in graduate students a broad and deep knowledge of their chosen discipline, the research methodology of the discipline and the development of those competencies necessary for their personal advancement in their scholarly, professional or creative careers.

Through the steady flow of its graduates into the community, the School strives to assist contemporary society to meet its need for educated individuals willing to be of service to others.

FACULTY

HELMUT EPP, PH.D.
Associate Professor and Dean
Northwestern University

L. EDWARD ALLEMAND, PH.D.
Professor Emeritus
University of Louvain

GARY ANDRUS, PH.D.
Associate Professor
Wayne State University

ULRIKE AXEN, M.S.
Instructor
DePaul University

KAREN L. BERNSTEIN, PH.D.
Assistant Professor
State University of New York at Stony Brook

ANDRE BERTHIAUME, PH.D.
Assistant Professor
University of Montreal

MICHAEL S. BORELLA, PH.D.
Assistant Professor
University of California, Davis

GREGORY BREWSTER, PH.D.
Assistant Professor
University of Wisconsin

SUSY S. CHAN, PH.D.
Associate Professor
Syracuse University

I-PING CHU, PH.D.
Associate Professor
State University of New York at Stony Brook

ANTHONY CHUNG, PH.D.
Assistant Professor
University of Maryland

KAMAL DAHIBUR, M.S.
Instructor
DePaul University

LAWRENCE DIBBEN, PH.D.
Adjunct Professor
Illinois Institute of Technology

CLARK ELLIOTT, PH.D.
Assistant Professor
Northwestern University

ROBERT JAMES FISHER, PH.D.
Associate Professor
Harvard University

DANIEL D. FU, PH.D.
Instructor
University of Chicago

GERALD GORDON, PH.D.
Associate Professor
University of California, Berkeley

HENRY HARR, PH.D.
Associate Professor
Illinois Institute of Technology

XIAOPING JIA, PH.D.
Associate Professor
Northwestern University

RICHARD JOHNSONBAUGH, PH.D.
Professor
University of Oregon

STEVE JOST, PH.D.
Associate Professor
Northwestern University
PURPOSES

The School of Computer Science, Telecommunications and Information Systems offers graduate level, professional education in these areas: artificial intelligence, computer science, data analysis, database, data communications, human-computer interaction, information systems, project management, software engineering, telecommunication systems, visual computing, and management information systems. Students choose from a broad collection of courses to develop, in depth, the research habits and practical skills needed for research and professional practice. The School's programs are designed to provide its graduates with the technical competence and the flexibility necessary to respond to both present and future opportunities in the computing professions.
FACILITIES

DePaul's Information Services Division (ISD) houses a large network of computers and allows students access to a rich computing environment. The configuration includes several Sun SPARCcenters 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, 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.

ISD and School computers are connected through multiple Ethers. The School's computers and laboratories form several subnets using TCP/IP. A separate Starlan network connects the ISD IBM PC laboratories. DePaul is connected to the Internet.

PROGRAMS

The school offers graduate work leading to the Master of Science and Doctor of Philosophy degrees as well as non-degree programs for professional development. The M.S. is a terminal degree. A degree in computer science or a related field is required for consideration for the Doctor of Philosophy degree. The curricula cover theoretical foundations, state-of-the-art techniques and skills, and major trends. The school offers programs in the following areas:

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.
MASTER OF SCIENCE IN COMPUTER SCIENCE

The Master's degree program consists of three phases:

- Prerequisite Phase.
- Core Knowledge Phase.
- Advanced Phase.

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the Prerequisite Phase constitutes part of the admission requirements for the master's degree program.

The Core Knowledge and Advanced Phases constitute the degree program. The Core Knowledge Phase prepares students for their chosen concentration. In the Advanced Phase, students specialize in their concentration area. The concentration requirements are tailored to meet individual student's needs. The student must pass an examination to move from one phase to the other.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate school admission requirements initially receive conditional admittance and may then pursue a degree program. For full admission to a degree program, students must have the following:

- Bachelor's degree (not necessarily in computer science).
- Counseling session with a graduate counselor.
- A grade of B- or better in the Prerequisite Phase courses.

At the time of admission, students with an undergraduate major in Computer Science or an allied field, who have successfully completed the GRE subject test, may petition the admissions committee to waive all Prerequisite Phase requirements. If the Prerequisite Phase requirements are not waived by the admissions committee, the requirements can be met by taking the courses at DePaul and receiving a grade of at least B-.

Alternatively, the Prerequisite Phase course requirements can be met by taking an equivalency exam, the Graduate Assessment Exam (GAE). The GAE is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a study guide are available from the school (phone 312/362-8714). For more information on this exam, contact a graduate advisor.
PREREQUISITE PHASE: COMPUTER SCIENCE

Sequence A:

CSC 215  Introduction to Programming Using C++.
CSC 310  Principles of Computer Science I. Prerequisite: CSC 215.
CSC 415  Foundations of Computer Science I. Prerequisite: CSC 310.
CSC 417  Foundations of Computer Science III. Prerequisite: CSC 416.

OR

Sequence B (restricted to graduate students with programming experience):

CSC 225  C++ for Programmers.
CSC 415  Foundations of Computer Science I. Prerequisite: CSC 225.
CSC 417  Foundations of Computer Science III. Prerequisite: 416.

All students must fulfill the following requirements:

CSC 343  Introduction to Operating Systems. Prerequisite: CSC 215 or 225.
CSC 345  Computer Architecture. Prerequisite: CSC 215 or 225.
CSC 323  Data Analysis and Statistical Software I.

DEGREE REQUIREMENTS

Students must complete 13 courses (52 hours) beyond the Prerequisite Phase after receiving full degree-seeking admission. Successful completion of the Master of Science in Computer Science consists of:

• Completion of Core Knowledge Phase courses.
• Passing the Core Knowledge examination.
• Completion of Advanced Phase courses.

Conditionally admitted students may register for a maximum of three graduate courses prior to successful completion of the Prerequisite Phase with consent of their advisor. Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.
MASTER OF SCIENCE IN COMPUTER SCIENCE

CORE KNOWLEDGE PHASE COURSES: COMPUTER SCIENCE
CSC 447  Concepts of Programming Languages
CSC 491  Design and Analysis of Algorithms
SE 455  Software Development Methods

CORE KNOWLEDGE EXAMINATION: COMPUTER SCIENCE
The examination covers the subject matter of the Core Knowledge Phase courses. Students take this examination following successful completion of the Core Knowledge Phase course requirements. The exam is offered in the Autumn, Winter, and Spring quarters. Students are allowed no more than two attempts at this examination. Two failures result in dismissal from the graduate program. Call the school at (312)362-8714 for further details on this examination.

Students who pass the Core Knowledge Examination with distinction and who maintain a 3.75 grade point average will graduate with distinction.

Note: Students must submit a written application three months before taking the Core Knowledge Examination. Only fully admitted students may take the examination.

ADVANCED PHASE COURSES: COMPUTER SCIENCE
Waiver of some of these courses is possible in individual cases with the approval of the CTI associate dean. Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

The Advanced Phase consists of ten courses, at least four of which must be designated as Level II courses. The ten courses are as follows:
- Four courses from a primary concentration area, at least two of which are designated as Level II courses
- Three courses from a secondary concentration area
- Three elective courses (see the Elective Course Restriction below)

The primary and secondary concentration areas are chosen from the list below. If a course is listed in both of the concentration areas, it may only count toward fulfilling the course requirements of one of the areas.

ARTIFICIAL INTELLIGENCE CONCENTRATION
LEVEL I
CSC 456  Foundations of Intelligent Databases
CSC 457  Expert Systems
CSC 458  Symbolic Programming
CSC 578  Neural Networks I

LEVEL II
CSC 556  Foundations of Artificial Intelligence
CSC 579  Neural Networks II
CSC 582  Machine Learning
CSC 583  Natural Language Processing
CSC 585  Knowledge Representation
CSC 587  Cognitive Science
CSC 594  Topics in Artificial Intelligence

COMPUTER GRAPHICS CONCENTRATION
LEVEL I
CSC 436  Foundations of Visual Computing
CSC 469  Computer Graphics I
CSC 470  Survey of Computer Graphics
# Master of Science in Computer Science

## Level II
- **CSC 536**: Modeling for Computer Aided Design
- **CSC 539**: Computer Graphics II
- **CSC 570**: Visualization
- **CSC 595**: Topics in Graphics

## Computer Vision Concentration
### Level I
- **CSC 436**: Foundations of Visual Computing
- **CSC 481**: Pattern Recognition and Image Processing
- **CSC 498**: Digital Signal Processing

### Level II
- **CSC 538**: Vision Systems
- **CSC 584**: Computer Vision
- **CSC 592**: Topics in Computer Vision and Pattern Recognition

## Data Analysis Concentration
### Level I
- **CSC 423**: Data Analysis and Regression
- **CSC 425**: Categorical Data Analysis
- **CSC 428**: Data Analysis for Experimenters
- **SE 468**: Software Measurement

### Level II
- **SE 467**: Software Reliability
- **CSC 523**: Multivariate Data Analysis
- **CSC 524**: Advanced Data Analysis
- **CSC 598**: Topics in Data Analysis

## Database Systems Concentration
### Level I
- **CSC 449**: Database Systems
- **CSC 451**: Database Design
- **CSC 452**: Database Programming

### Level II
- **CSC 549**: Advanced Database Systems
- **CSC 550**: Object-Oriented Databases
- **CSC 551**: Distributed Database Systems
- **CSC 589**: Topics in Databases

## Data Communications Concentration
### Level I
- **TDC 462**: Data Communications
- **TDC 463**: Computer Networks and Data Systems
- **TDC 561**: Network Programming

### Level II
- **TDC 432**: Computer and Information Systems Modeling
- **TDC 489**: Queueing Theory with Computer Applications
- **TDC 513**: Client/Server Technologies
- **TDC 562**: Computer Communications Network Design and Analysis
- **TDC 563**: Protocols and Techniques for Data Networks
- **TDC 564**: Local Area Networks
- **TDC 566**: Voice and Data Integration
- **TDC 568**: Network Management
MASTER OF SCIENCE IN COMPUTER SCIENCE

SYSTEMS FOUNDATIONS CONCENTRATION
LEVEL I
CSC 426  Values and Computer Technology
CSC 434  Object-Oriented Programming
CSC 444  Automata Theory and Formal Grammars (formerly CSC 493)
CSC 448  Compiler Design
LEVEL II
CSC 503  Parallel Algorithms
CSC 504  Parallel Processing
CSC 535  Formal Semantics
CSC 544  Advanced Theoretical Computer Science (formerly CSC 490)
CSC 545  Advanced Computer Organization
CSC 546  Advance Operating Systems
CSC 548  Advanced Compiler Design
CSC 599  Topics in Computer Science

The following concentration areas from other divisions of the School may be selected for a secondary concentration only:

HUMAN-COMPUTER INTERACTION CONCENTRATION
LEVEL I
HCI 400  Analysis and Design for HCI
HCI 401  User Interface Design
HCI 430  Prototyping for Human-Computer Interaction 1
LEVEL II
HCI 422  Multimedia
Any 500-level HCI course

INFORMATION SYSTEMS CONCENTRATION
LEVEL I
IS 427  Software Quality Management
IS 475  Information Systems Analysis and Design
IS 483  Information Systems Management
LEVEL II
IS 553  Advanced Topics for Systems Development
IS 574  Decision Support Systems and Expert Systems
IS 577  Management of Information Technology
IS 596  Topics in Information Systems

SOFTWARE ENGINEERING CONCENTRATION
LEVEL I
SE 420  Software Design
SE 430  Object-Oriented Programming
SE 431  Formal Software Specifications and Development I
SE 450  Object-Oriented Software Development
SE 465  Software Engineering Principles
LEVEL II
SE 451  Distributed Software Development
SE 466  Software Engineering Projects
SE 480  Software Architecture
SE 531  Formal Software Specifications and Development II
SE 533  Software Validation and Verification
PERSONALIZED CONCENTRATION

Students with superior results on the Core Knowledge Phase examination may be allowed to personalize their Advanced Phase requirements. After planning their personalized concentration with their advisor, they must submit the plan to the CTI associate dean for approval. Permission for the personalized concentration must be obtained prior to completion of most of the concentration courses.

ELECTIVE COURSE RESTRICTIONS

Elective courses are those courses in the range 420-599, 690-699 and HCI 400-419. Credit will be given for courses taken outside the school only if they are approved by the CTI associate dean. Consult the appropriate section of the bulletin on the transfer credit policies of the School. An application may be obtained from the School.

Courses suggested for the Prerequisite Phase never count for elective credit. (This includes TDC 411, CSC 415, 416, 417 and 500-level GSB courses.) Courses required for the Core Knowledge Phase only count for elective credit if they are not required for the student's own concentration.

Any course required for the student's concentration but taken as part of the requirements of another degree earned by the student may be waived but cannot be used for elective credit. Conditionally admitted students may not receive elective credit for courses taken prior to completing the Prerequisite Phase. Fully admitted students will receive elective credit for courses taken before passing the Core Knowledge Examination only if the total number of advanced courses taken does not exceed four.

GRADE REQUIREMENTS

Fully admitted students must maintain a grade point average of at least 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The School will notify such students as soon as possible. However, students who take courses after their average falls below 2.50, but before official notification, will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum of 4.00).

Incomplete grades are only given if the course instructor considers them justified and if the student obtains the approval of the associate dean. The Student Services office will provide the appropriate permission form. An incomplete must be completed within one year or the grade will be changed to an F.
MASTER OF SCIENCE IN DISTRIBUTED SYSTEMS

The Master's degree program consists of three phases:

- Prerequisite Phase.
- Core Knowledge Phase.
- Advanced Phase.

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the Prerequisite Phase constitutes part of the admission requirements for the master's degree program.

The Core Knowledge and Advanced Phases constitute the degree program. The Core Knowledge Phase prepares students for their chosen concentration. In the Advanced Phase, students specialize in their concentration area. The concentration requirements are tailored to meet individual student's needs. The student must pass an examination to move from one phase to the other.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate school admission requirements initially receive conditional admittance and may then pursue a degree program. For full admission to a degree program, students must have the following:

- Bachelor's degree (not necessarily in computer science).
- Counseling session with a graduate counselor.
- A grade of B- or better in the Prerequisite Phase courses.

At the time of admission, students with an undergraduate major in Computer Science or an allied field, who have successfully completed the GRE subject test, may petition the admissions committee to waive all Prerequisite Phase requirements. If the Prerequisite Phase requirements are not waived by the admissions committee, the requirements can be met by taking the courses at DePaul and receiving a grade of at least B-.

Alternatively, the Prerequisite Phase course requirements can be met by taking an equivalency exam, the Graduate Assessment Exam (GAE). The GAE is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a study guide are available from the school (phone 312/362-8714). For more information on this exam, contact a graduate advisor.

PREREQUISITE PHASE COURSES: DISTRIBUTED SYSTEMS

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 215</td>
<td>Introduction to Structured Programming using C++ And</td>
</tr>
<tr>
<td>CSC 310</td>
<td>Principles of Computer Science I</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>CSC 225</td>
<td>C++ for Programmers</td>
</tr>
<tr>
<td>CSC 323</td>
<td>Data Analysis and Statistical Software I</td>
</tr>
<tr>
<td>CSC 343</td>
<td>Introduction to Operating Systems Prerequisite: CSC 225 or CSC 310</td>
</tr>
<tr>
<td>CSC 345</td>
<td>Computer Architecture Prerequisite: CSC 225 or CSC 310</td>
</tr>
<tr>
<td>CSC 415</td>
<td>Foundations of Computer Science I Prerequisite: CSC 225 or CSC 310</td>
</tr>
<tr>
<td>CSC 416</td>
<td>Foundations of Computer Science II Prerequisite: CSC 415</td>
</tr>
</tbody>
</table>

DEGREE REQUIREMENTS

Students must complete 13 courses (32 credits) beyond the Prerequisite Phase after receiving full degree-seeking admission. Successful completion of the Master of Science in Distributed Computing consists of:

- Completion of the Core Knowledge Phase courses
- Passing the Core Knowledge examination
- Completion of Advanced Phase courses

Conditionally admitted students may register for a maximum of three graduate courses prior to successful completion of the Prerequisite Phase with consent of their advisor. Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

CORE KNOWLEDGE PHASE COURSES: DISTRIBUTED SYSTEMS

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 420</td>
<td>Foundations of Distributed Systems</td>
</tr>
<tr>
<td>SE 450</td>
<td>Object-Oriented Software Development</td>
</tr>
<tr>
<td>TDC 463</td>
<td>Computer Networks</td>
</tr>
</tbody>
</table>
MASTER OF SCIENCE IN DISTRIBUTED SYSTEMS

CORE KNOWLEDGE EXAMINATION: DISTRIBUTED SYSTEMS

The examination covers the subject matter of the Core Knowledge Phase courses. Students take this examination following successful completion of the Core Knowledge Phase course requirements. The exam is offered in the Autumn, Winter, and Spring quarters. Students are allowed no more than two attempts at this examination. Two failures will result in dismissal from the graduate program. Call the School at (312) 362-8714 for further details on the examination.

Students who pass the Core Knowledge Examination with distinction and maintain a 3.75 grad point average will graduate with distinction.

Note: Students must submit a written application three months before taking the Core Knowledge Examination. Only fully admitted students may take the examination.

ADVANCED PHASE COURSES: DISTRIBUTED SYSTEMS

Waiver of some of these courses is possible in individual cases with approval of the CITT associate dean. Fully admitted students may register for a maximum of four Advanced Phase course prior to passing the Core Knowledge Examination.

CSC 449 Database Technologies
SE 451 Distributed Software Development
TDC 561 Network Programming
DS 520 Distributed Systems Practicum

Three of the following:

CSC 447 Concepts of Programming Languages
CSC 491 Design and Analysis of Algorithms
DS 513 Client/Server Technologies
CSC 545 Advanced Computer Organization
CSC 546 Operating System Design
CSC 551 Distributed Database Systems
DS 594 Distributed Systems Project
HCI 401 User Interface Design
TDC 462 Data Communications
IS 555 Design and Strategies for Internet Commerce

Three elective courses (see Elective Course Restrictions section below)

ELECTIVE COURSE RESTRICTIONS

Elective courses are those in the range of 420-599 and 690-699, including HCI 400-410. Credit will be given for courses taken outside the School only if they are approved by the CIT associate dean. Consult the appropriate section of this bulletin for the transfer credit policy of the School. An application may be obtained from the School.

Courses suggested for the Prerequisite Phase never count for elective credit. (This includes TDC 411, CSC 415, 416, 417 and 500-level GSB course). Courses required for the Core Knowledge Phase only count for elective credit if they are not required for the student's concentration.

Any courses required for the student's concentration but taken as part of the requirements of another degree earned by the student may be waived, but cannot be used for elective credit. Conditionally admitted students may not receive elective credit for courses taken prior to passing the Prerequisite Phase. Fully admitted students will receive elective credit for courses taken before passing the Core Knowledge Examination only if the total number of advanced courses taken does not exceed four.

GRADE REQUIREMENTS

Fully admitted students must maintain a grade point average of 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The School will notify such students as soon as possible. However, students who take courses after their grade point average has fallen below 2.50, but before official notification, will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum 4.00).

Incomplete grades are only given if the course instructor considers them justified and if the student obtains the approval of the associate dean. The Student Services office will provide the appropriate permission form. An incomplete must be completed within a year or the grade will be changed to an F.
MASTER OF SCIENCE IN HUMAN-COMPUTER INTERACTION

MASTER OF SCIENCE: HUMAN-COMPUTER INTERACTION

The master's degree program consists of the following elements:

- Prerequisite Phase
- Fundamentals Courses
- Core Courses
- Advanced Phase
- Capstone Course

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the prerequisite competencies constitutes part of the admission requirements for the master's degree program. The Fundamentals, Core and Advanced Phase constitute the degree program.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate college admission requirements initially receive conditional admittance and may then pursue a degree program. For full admission to a degree program, students must have the following:

- Bachelor's degree
- Counseling session with a graduate counselor.
- A grade of 'B-' or better in the prerequisite competency courses.

The following prerequisite phase courses are required. These requirements may be met by taking the courses at DePaul and receiving a grade of at least B-. Students with related course work or experience should consult a graduate advisor for possible waiver of prerequisite course requirements.

PREREQUISITE PHASE: HUMAN-COMPUTER INTERACTION

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 105</td>
<td>Foundation Design</td>
</tr>
<tr>
<td>ART 260</td>
<td>Graphic Design I</td>
</tr>
<tr>
<td>CSC 150</td>
<td>Introduction to Computer Systems and Programming</td>
</tr>
<tr>
<td>CSC 240</td>
<td>Personal Computing for Programmers</td>
</tr>
<tr>
<td>CSC 255</td>
<td>Information Structures and Representations</td>
</tr>
<tr>
<td>CSC 323</td>
<td>Data Analysis and Statistical Software I</td>
</tr>
<tr>
<td>PSY 105</td>
<td>Introductory Psychology I</td>
</tr>
<tr>
<td>PSY 347</td>
<td>Social Psychology</td>
</tr>
</tbody>
</table>

DEGREE REQUIREMENTS

Students must complete 13 courses (52 hours) beyond the prerequisite phase after receiving full degree-seeking admission. Successful completion of the Master of Science in Human-Computer Interaction consists of:

- Completion of the Fundamentals courses
- Completion of the Core courses
- Completion of Advanced Phase courses
- Completion of the Capstone course

Conditionally admitted students may register for a maximum of three graduate courses prior to successful completion of the prerequisite phase with consent of their advisor.

FUNDAMENTALS COURSES: HUMAN-COMPUTER INTERACTION

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 461</td>
<td>Graphic Design II</td>
</tr>
<tr>
<td>HCI 400</td>
<td>Analysis and Design for HCI</td>
</tr>
<tr>
<td>PSY 680</td>
<td>Industrial and Organizational Psychology</td>
</tr>
<tr>
<td>PSY 443</td>
<td>Psychology of Human Performance</td>
</tr>
</tbody>
</table>
MASTER OF SCIENCE IN HUMAN-COMPUTER INTERACTION

CORE COURSES: HUMAN-COMPUTER INTERACTION

HCI 410  Introduction to Human-Computer Interaction
HCI 430  Prototyping for Human-Computer Interaction I
HCI 460  Evaluating Human-Computer Interaction

ADVANCED PHASE COURSES: HUMAN-COMPUTER INTERACTION

Conditionally admitted students must receive written permission from their advisor to take Advanced Phase courses.
Five courses, to be taken from at least two categories:

DESIGN

ART 405  Advanced Color Design
ART 462  Publication Design
HCI 422  Multimedia
HCI 511  Designing for Disabilities
HCI 512  Designing for Visualization
HCI 590  Topics in Human-Computer Interaction

COMPUTER SCIENCE

CSC 436  Foundations of Visual Computing
CSC 469  Computer Graphics I
CSC 470  Survey of Computer Graphics
CSC 539  Computer Graphics II
CSC 570  Visualization
HCI 540  User Interface Implementation I

EVALUATION

CSC 423  Data Analysis and Regression
CSC 424  Advanced Data Analysis
PSY 402  Perceptual Processes
PSY 404  Learning and Cognitive Processes
PSY 440  Psychology of Work and Motivation
PSY 441  Psychology of Leadership
PSY 446  Psychological Theories of Organizations
PSY 447  Organizational Consultation

CAPSTONE COURSE: HUMAN-COMPUTER INTERACTION

HCI 594  Human-Computer Interaction Capstone

GRADE REQUIREMENTS

Fully admitted students must maintain a grade point average of at least 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The school will notify such students as soon as possible. However, students who take courses after their average falls below 2.50 but before official notification will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum of 4.00).

An incomplete grade is only given if the course instructor considers it justified and if the student obtains the associate dean's permission. Incomplete grade request forms are available in the Student Services Office. An incomplete must be completed within one year or the grade will be changed to an F.
MASTER OF SCIENCE IN INFORMATION SYSTEMS

The master's degree program consists of three phases:

- Prerequisite Phase
- Core Knowledge Phase
- Advanced Phase

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the Prerequisite Phase constitutes part of the admission requirements for the master's degree program.

The Core Knowledge and Advanced Phase constitute the degree program. The Core Knowledge Phase prepares students for their chosen concentration. In the Advanced Phase, students specialize in their concentration area. The concentration requirements are tailored to meet individual student's needs. The student must pass an examination to move from the Core Knowledge Phase to the Advanced Phase.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate school admission requirements initially receive conditional admittance and may then pursue a degree program.

For full admission to a degree program, students must have the following:

- Bachelor's degree (not necessarily in computer science).
- Counseling session with a graduate counselor.
- A grade of B- or better in the Prerequisite Phase courses.

The following courses are required as part of the Prerequisite Phase. Those students with extensive coursework and/or experience in the computer science field may take an equivalency exam, the Graduate Assessment Exam (GAE), for the courses. The exam is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a study guide are available from the School (312/362-8714). For more information on this exam, contact a graduate advisor.

PREREQUISITE PHASE COURSES:
STANDARD INFORMATION SYSTEMS

PROGRAMMING SKILLS
Suggested courses are:

- **CSC 215**: Introduction to Programming Using C++ OR
- **CSC 225**: C++ for Programmers

APPLICATIONS DEVELOPMENT
Suggested course is:

- **CSC 203**: COBOL Programming

PERSONAL COMPUTING SKILLS
Suggested course is:

- **CSC 240**: Personal Computing for Programmers

SYSTEMS ANALYSIS

- **CSC 315**: Analysis and Design Techniques

QUANTITATIVE METHODS

- **MAT 145**: Calculus for Information Systems OR **MAT 150-151**
- **CSC 323**: Data Analysis and Statistical Software I

The Computer Career Program (CCP) offered through the School's Institute for Professional Development may fulfill part of the requirement for prerequisite phase courses.
MASTER OF SCIENCE IN INFORMATION SYSTEMS

DEGREE REQUIREMENTS
Students must complete 13 courses (52 hours) beyond the Prerequisite Phase and after receiving full degree-seeking admission.
Successful completion of the Master of Science in Information Systems consists of:

- Completion of Core Knowledge Phase courses.
- Passing the Core Knowledge examination.
- Completion of Advanced Phase courses.

CORE KNOWLEDGE PHASE COURSES: INFORMATION SYSTEMS
Conditionally admitted students may register for a maximum of three graduate courses prior to successful completion of the Prerequisite Phase with consent of their advisor. Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

CSC 449 Database Systems
IS 475 Information Systems Analysis and Design
TDC 461 Basic Communications Systems

CORE KNOWLEDGE EXAMINATION: INFORMATION SYSTEMS
The examination covers the subject matter of the Core Knowledge Phase courses. Students take this examination as soon as they successfully complete their Core Knowledge Phase course requirements. The exam is offered in the Autumn, Winter, and Spring quarters. Students are allowed no more than two attempts at this examination. Two failures result in dismissal from the graduate program. Call the School at (312)362-8714 for further details on this examination.

Students who pass the Core Knowledge Examination with distinction and maintain a 3.75 grade point average will graduate with distinction.

Note: The student must submit a written application three months before taking the Core Knowledge Examination. Only fully admitted students may take the examination.

ADVANCED PHASE COURSES: INFORMATION SYSTEMS
Waiver of some of these courses is possible in individual cases with the approval of a faculty advisor.

Two courses in one of the following areas (selected in consultation with the faculty advisor):
- Communications
- Computer Vision/Graphics
- Database Systems
- Distributed Systems
- Human-Computer Interaction
- Software Engineering

Four of the following:

IS 427 Software Quality Management
IS 481 Communications for Software and Systems Project
IS 482 Legal Aspects of Data Processing
IS 483 Information Systems Management
IS 484 Computerized Accounting Systems
IS 553 Advanced Topics for Systems Development
IS 554 Information Engineering
IS 555 Design and Strategies for Internet Commerce
IS 571 Software Maintenance
MASTER OF SCIENCE IN INFORMATION SYSTEMS

IS 572  Computer Security
IS 574  Decision Support Systems and Expert Systems
IS 575  Information Retrieval
IS 577  Management of Information Technology
IS 596  Topics in Information Systems
SE 430  Object-Oriented Modeling
IS 690  Research Seminar
IS 696  Master's Project
IS 698  Master's Thesis

Four elective courses.

ELECTIVE COURSE RESTRICTIONS

Elective course restrictions are those in the range of 420-599 and 690-599 including HCI 400-410. Credit will be given for courses taken outside of the School only if they are approved by the CTI associate dean. Consult the appropriate section of this bulletin for the transfer credit policy of the School. An application may be obtained from the School.

Courses suggested for the Prerequisite Phase never count for elective credit. (This includes TDC 411, CSC 415, 416, 417 and 500-level GSB courses). Course required for the Core Knowledge Phase only count for elective credit if they are not required for the student's concentration.

Any courses required for the student's concentration, but taken as part of the requirements of another degree earned by the student may be waived, but cannot be used for elective credit. Conditionally admitted students may not receive elective credit for courses taken prior to passing the Prerequisite Phase. Fully admitted students will receive elective credit for courses taken before passing the Core Knowledge Examination only if the total number of advanced courses taken does not exceed four.

GRADE REQUIREMENTS

Fully admitted students must maintain a grade point average of 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The School will notify such students as soon as possible. However, students who take courses after their grade point average has fallen below 2.50, but before official notification, will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum 4.00).

Incomplete grades are given only if the course instructor considers them justified and if the student obtains the approval of the associate dean. The Student Services office will provide the appropriate permission form. An incomplete must be completed within a year or the grade will be changed to an F.
MASTER OF SCIENCE IN SOFTWARE ENGINEERING

The master's degree program consists of three phases:

- Prerequisite Phase.
- Core Knowledge Phase.
- Advanced Phase.

The Prerequisite Phase is required for students who need a more complete background in Computer Science. The Core Knowledge Phase prepares students for their chosen concentration, while the Advanced Phase provides for study of selected, more advanced topics.

ADMISSION REQUIREMENTS

For full admission to the degree program, students must have the following:

- Bachelor of Science degree in Computer Science, Computer Engineering, or a closely related field. Applicants with degrees in other fields, but with a strong background in mathematics and/or extensive programming experience will be considered for either full admission or conditional admission. Individuals with little or no experience in computing should acquire a stronger background before applying to the program.

- Counseling session with a Software Engineering counselor.

- Completion of courses equivalent to the Prerequisite Phase courses. Applicants may be fully admitted with a limited number of Prerequisite Phase courses. These courses must be completed with a grade of B- or better before enrolling in any Core Knowledge Phase courses that require them as prerequisites.

Applicants who have a strong academic background but who have not completed a sufficient number of Prerequisite Phase courses may be admitted conditionally. Such students must complete the full Prerequisite Phase requirements as listed below.

GRADUATE ASSESSMENT PREREQUISITE PHASE COURSES:
SOFTWARE ENGINEERING

The following courses are required as part of the Prerequisite Phase. Those students with appropriate coursework and/or computing experience may take an equivalency exam, the Graduate Assessment Exam (GAE), for these courses. The Exam is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a study guide are available from the School (312/362-8714). For more information on this exam, contact a graduate advisor. A grade of B- or better is required in the Prerequisite Phase courses.

PREREQUISITE PHASE COURSES: SOFTWARE DEVELOPMENT

CSC 225  C++ for Programmers
CSC 315  Analysis and Design Techniques
CSC 415  Foundations of Computer Science I
CSC 416  Foundations of Computer Science II
CSC 417  Foundations of Computer Science III

PREREQUISITE PHASE COURSES: PROJECT MANAGEMENT

CSC 225  C++ for Programmers
CSC 315  Analysis and Design Techniques
CSC 415  Foundations of Computer Science I
CSC 416  Foundations of Computer Science II

One of the following:
CSC 349  Databases and Data Management.
HCI 322  Multimedia.
TDC 361  Basic Communications Systems

23
MASTER OF SCIENCE IN SOFTWARE ENGINEERING

OTHER PREREQUISITE PHASE COURSES

The following competencies are required as part of the Prerequisite Phase. Equivalency exams are not offered for the following courses. Students with related coursework and/or experience in these areas should consult with a graduate advisor.

CSC 323 Data Analysis and Statistical Software I
MAT 150, 151 Calculus I, II OR
MAT 145 Calculus of Information Systems
SE 400 Introduction of Formal Methods

DEGREE REQUIREMENTS

Students must complete 14 courses (56 hours) beyond the Prerequisite Phase after receiving full degree-seeking admission. Successful completion of the Software Engineering Program consists of:

- Completion of Core Knowledge Phase courses with a grade of B or better. Students with prior coursework equivalent to any of the Core Knowledge Phase courses may be allowed by a Software Engineering counselor to take other related advanced courses as substitutes.
- Completion of Advanced Phase courses.
- Successful defense of the thesis. Students should choose a thesis advisor before the end of the first quarter following completion of the Core Knowledge Phase. Students should form a thesis committee, consisting of three faculty members, including the thesis advisor, by the end of the next quarter. Students must complete the course CSC 690 Research Seminar, write a thesis proposal, and obtain approval of the thesis proposal from the thesis committee before enrolling in the course CSC 698 Master's Thesis.

CORE KNOWLEDGE PHASE COURSES: SOFTWARE ENGINEERING

Students may register for graduate courses only after meeting all prerequisite requirements. The required courses are:

SOFTWARE DEVELOPMENT CONCENTRATION
SE 430 Object-Oriented Modeling
SE 431 Formal Software Specifications and Development I
SE 455 Software Development Methods
SE 465 Software Engineering Principles
SE 491 Software Engineering Studio

PROJECT MANAGEMENT CONCENTRATION
CSC 423 Data Analysis and Regression
SE 430 Object-Oriented Modeling
SE 450 Object-Oriented Software Development
SE 465 Software Engineering Principles
SE 468 Software Measurement and Project Estimation
SE 477 Software and System Project Management
SE 491 Software Engineering Studio
MASTER OF SCIENCE IN SOFTWARE ENGINEERING

ADVANCED PHASE COURSES: SOFTWARE ENGINEERING
Conditionally admitted students receive credit for Advanced Phase courses only after successful completion of the Prerequisite Phase. Students must complete the following:

SOFTWARE DEVELOPMENT CONCENTRATION
SE 690    Research Seminar
SE 698    Master's Thesis

Five of the following courses, other than those required for your concentration and other than those cross-listed with one of your prerequisites. At least two of these must be software engineering. Two elective courses (see Elective Course Restriction below).

Note: Continuous enrollment in SE 699 Software Engineering Research Continuation is required after enrollment in SE 696 Master’s Project until the project is completed.

PROJECT MANAGEMENT CONCENTRATION:
SE 696    Masters Project

Four of the following courses, other than those required for your concentration and other than those cross-listed with one of your prerequisites. At least two of these must be software engineering. Two elective courses (see Elective Course Restrictions section below).

Note: Continuous enrollment in SE 699 Software Engineering Research Continuation is required after enrollment in SE 696 Master’s Project until the project is completed.

CSC 423    Data Analysis and Regression
CSC 426    Values and Computer Technology
CSC 428    Data Analysis for Experimenters
CSC 434    Object-Oriented Programming
CSC 447    Concepts of Programming Languages
CSC 449    Database Systems
HCI 401    User Interface Design
IS 553    Advanced Topics for System Development
IS 571    Software Maintenance
SE 420    Object-Oriented Design
SE 431    Formal Software Specification and Development I
SE 433    Software Testing
SE 450    Object-Oriented Software Development
SE 451    Distributed Software Development
SE 455    Software Development Methods
SE 466    Software Engineering Projects
SE 467    Software Reliability
SE 468    Software Measurement and Project Estimation
SE 469    Software Safety
SE 477    Software and System Project Management
SE 480    Software Architecture
SE 529    Software Risk Management
SE 531    Formal Software Specifications and Development II
SE 533    Software Validation and Verification
SE 558    Software Methodologies

Two elective courses (See Elective Course Restrictions below).

ELECTIVE COURSE RESTRICTIONS
Elective courses are those courses in the range 420-599 and 690-699 and HCI 400-419. Credit will be given for courses taken outside the School only if they are approved by the CTI associate dean. Consult the appropriate section of this bulletin on the transfer credit policies of the School. An application can be obtained from the School.
Courses suggested for the Prerequisite Phase never count for elective credit (including CSC 411, 415, 416, 417 and 500-level GSB courses). For students in the Project Management Concentration, graduate courses cross-listed with their two prerequisite courses chosen from CSC 349 (CSC 449), HCI 322 (HCI 422), and CSC 361 (TDC 461) do not count for graduate credit, but the other graduate course may be counted with written permission from a software engineering advisor.

Any required course taken as part of the requirements of another degree earned by the student may be waived but cannot be used for elective credit. Conditionally admitted students may not receive elective credit for courses taken prior to completing the Prerequisite Phase.

**GRADE REQUIREMENTS**

Fully admitted students must maintain an average of at least 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The school will notify such students as soon as possible. However, students who take courses after their average falls below 2.50, but before official notification, will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum of 4.00).

Incomplete grades are only given if the course instructor considers them justified and if the student obtains the associate dean's permission. The Student Services office will provide the appropriate permission form. An incomplete must be completed within one year or the grade will be changed to an F.
MASTER OF SCIENCE IN TELECOMMUNICATION SYSTEMS

The master’s degree program consists of three phases:

- Prerequisite Phase.
- Core Knowledge Phase.
- Advanced Phase.

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the Prerequisite Phase constitutes part of the admission requirements for the master’s degree program.

The Core Knowledge and Advanced Phase constitute the degree program. The Core Knowledge Phase prepares students for their chosen concentration. In the Advanced Phase, students specialize in their concentration area. The concentration requirements are tailored to meet individual student’s needs. The student must pass an examination to move from one phase to another.

Two concentrations are offered: the Standard Concentration which provides a standard set of courses emphasizing telecommunications systems management, and the Computer Science Concentration, which requires more technical background and places more emphasis on systems development and analysis.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate school admission requirements initially receive conditional admittance and may then pursue a degree program.

For full admission to a degree program, students must have the following:

- Bachelor’s degree (not necessarily in computer science).
- Counseling session with a graduate counselor.
- A grade of B- or better in the Prerequisite Phase courses.

The following courses are required as part of the Prerequisite Phase. Those students with extensive coursework and/or experience in the computer science field may take an equivalency exam, the Graduate Assessment Exam (GAE), for the courses. The exam is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a study guide are available from the School (312/362-8714). For more information on this exam, contact a graduate advisor.

PREREQUISITE PHASE COURSES: TELECOMMUNICATION SYSTEMS

PROGRAMMING SKILLS
CSC 215 Introduction to Programming Using C++ OR
CSC 225 C++ for Programmers

PRINCIPLES OF COMPUTER SCIENCE (Required for Computer Science Concentration only)

Sequence A:
CSC 310 Principles of Computer Science I. **Prerequisite:** CSC 215
CSC 415 Foundations of Computer Science I. **Prerequisite:** CSC 310
CSC 416 Foundations of Computer Science II. **Prerequisite:** CSC 310, **Corequisite:** CSC 415

Sequence B: (restricted to graduate students who have completed CSC 225)
CSC 415 Foundations of Computer Science I. **Prerequisite:** CSC 225
CSC 416 Foundations of Computer Science II. **Prerequisite:** CSC 310, **Corequisite:** CSC 415

Those students who fulfill the C Language requirement with CSC 215 must complete Sequence A. Students with programming experience and who have met the requirement for CSC 225 may follow Sequence B.
MASTERC OF SCIENCE IN
TELECOMMUNICATION SYSTEMS

SYSTEMS FUNDAMENTALS
TDC 411  Computers in Information Systems and Telecommunications OR
May be satisfied by the following two undergraduate courses:
CSC 343  Introduction to Operating Systems.
CSC 345  Computer Architecture.

PHYSICS
PHY 405  Physical Principles of Communication Systems

QUANTITATIVE METHODS
CSC 323  Data Analysis and Statistical Software I
MAT 145  Calculus for Information Systems

DEGREE REQUIREMENTS
Students must complete 13 courses (52 hours) beyond the Prerequisite Phase and after receiving full degree-seeking admission.

Successful completion of the Master of Science in Telecommunication Systems consists of:
• Completion of Core Knowledge Phase courses.
• Passing the Core Knowledge examination.
• Completion of Advanced Phase courses.

The Core Knowledge and Advanced Phase courses are chosen from one of the following concentrations:
• Standard Telecommunications
• Computer Science.
Conditionally admitted students may register for a maximum of three graduate courses prior to successful completion of the Prerequisite Phase with consent of their advisor. Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

CORE KNOWLEDGE PHASE COURSES: TELECOMMUNICATION SYSTEMS
TDC 461  Basic Communication Systems
TDC 462  Data Communications
TDC 463  Computer Networks and Data Systems

CORE KNOWLEDGE EXAMINATION: TELECOMMUNICATION SYSTEMS
Students may take this examination as soon as they have successfully completed these three courses. The exam is offered in the Autumn, Winter, and Spring quarters. Students are allowed no more than two attempts at this examination. Two failures result in dismissal from the graduate program. Call the School at (312) 362-8714 for further details on this examination.

Students who pass the Core Knowledge Examination with distinction and who maintain a 3.75 grade point average will graduate with distinction.

Note: The student must submit a written application three months before taking the Core Knowledge Examination. Only fully admitted students may take the examination.

ADVANCED PHASE COURSES: TELECOMMUNICATION SYSTEMS
Students must fulfill the course requirements of their concentration. Waiver of some of these courses is possible in individual cases with the approval of the CTI associate dean.

Fully admitted students may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.
STANDARD TELECOMMUNICATIONS CONCENTRATION

TDC 464 Voice Communication Networks
TDC 476 Economics of Telecommunications Systems
TDC 511 Telecommunications Practicum
TDC 512 Cellular and Wireless Telecommunications
TDC 567 Telecommunications System Design and Management
TDC 569 Telecommunications Regulation, Policy and Law

Two of the following:

IS 577 Management of Information Technology
TDC 514 Computer Telephony
TDC 563 Protocols and Techniques for Data Networks
TDC 564 Local Area Networks
TDC 565 Voice and Data Integration
TDC 566 Integrated Services Digital Networks
TDC 568 Network Management

Two elective courses. (See Elective Course Restriction section below.)

COMPUTER SCIENCE CONCENTRATION

TDC 511 Telecommunications Practicum
TDC 561 Distributed Computing

Four of the following:

CSC 446 Operating Systems
TDC 432 Computer and Information System Modeling
TDC 464 Voice Communications Networks
TDC 489 Queuing Theory with Computer Applications
TDC 513 Client/Server Technologies
TDC 562 Computer Communication Network Design and Analysis
TDC 563 Protocols and Techniques for Data Networks
TDC 564 Local Area Networks
TDC 565 Voice and Data Integration
TDC 566 Integrated Services Digital Networks
TDC 568 Network Management

Four elective courses. (See Elective Course Restriction section below.)

ELECTIVE COURSE RESTRICTIONS

Elective courses are those courses in the range 420-599 and 690-699 and HCl 400-419. Credit will be given for courses taken outside the school only if they are approved by the CTI associate dean. Consult the appropriate section of this bulletin on the transfer credit policies of the School. An application can be obtained from the School.

Courses suggested for the Prerequisite Phase never count for elective credit. (This includes TDC 411, 415, 416, 417 and 500-level GSB courses.)

Any course required for the student's concentration but taken as part of the requirements of another degree earned by the student may be waived but cannot be used for elective credit. Conditionally admitted students may not receive elective credit for courses taken prior to completing the Prerequisite Phase. Fully admitted students will receive elective credit for courses taken before passing the Core Knowledge Examination only if the total number of advanced courses taken does not exceed four.
GRADE REQUIREMENTS

Fully admitted students must maintain a grade point average of at least 2.50 (out of a maximum of 4.00). Students who do not maintain this average are dismissed from the program. The school will notify such students as soon as possible. However, students who take courses after their average falls below 2.50, but before official notification, will not receive any special tuition refunds.

In order to graduate, students must have an overall grade point average no less than 2.50 (out of a maximum of 4.00).

Incomplete grades are only given if the course instructor considers them justified and if the student obtains the associate dean's permission. The Student Services Office will provide the appropriate permission form. An Incomplete must be completed within one year or the grade will be changed to an F.
MASTER OF SCIENCE IN MANAGEMENT INFORMATION SYSTEMS

The master's degree program consists of three phases:

- Prerequisite Phase.
- Core Knowledge Phase.
- Advanced Phase.

The Prerequisite Phase guarantees that all students have a common background. Successful completion of the Prerequisite Phase constitutes part of the admission requirements for the master's degree program.

The Core Knowledge and Advanced Phases constitute the degree program. The Core Knowledge Phase prepares students for their chosen concentration. In the Advanced Phase, students specialize in their concentration area. The concentration requirements are tailored to meet individual student's needs. The student must pass an examination to move from one phase to another.

ADMISSION REQUIREMENTS

All applicants who satisfy general graduate school admission requirements initially receive conditional admittance and may then pursue a degree program.

For full admission to a degree program, students must have the following:

- Bachelor's degree completed.
- Satisfactory completion of GMAT.
- Counseling session with a graduate counselor.
- A passing score on the Graduate Assessment Examination or a grade of B- or better in the corresponding Prerequisite Phase courses.

PREREQUISITE PHASE: MANAGEMENT INFORMATION SYSTEMS

The purpose of the Prerequisite Phase is to ensure a common background of knowledge in general business administration, software development, and quantitative methods. Successful completion of the Prerequisite Phase is required to move from the Prerequisite Phase to the Core Knowledge Phase and become fully admitted. To complete this phase, students either pass the DePaul courses listed below or pass the corresponding written examinations. A grade of B- or better is required in the software development courses. The exam is offered at the beginning of each month. Applications for the exam must be received at least one week before the exam. Exam dates, application forms and a detailed study guide are available from the School (312/362-8714). For more information on this exam, contact a graduate advisor. The MIS Prerequisite Phase covers the following topics:

INTERNAL ENVIRONMENT OF ORGANIZATIONS

ACC 500       Financial Accounting
MGT 500       Behavior of Organizations
MGT 502       Managing Operations for Competitive Advantage

EXTERNAL ENVIRONMENT OF ORGANIZATIONS

BLW 500       Legal and Ethical Environment
ECO 500       Money and Financial Systems
ECO 509       Business Conditions Analysis
IB 500        Global Economy
IS 553 Advanced Topics for Systems Development
IS 554 Information Engineering
IS 555 Design and Strategies for Internet Commerce
IS 571 Software Maintenance
IS 572 Computer Security
IS 574 Decision Support Systems and Expert Systems
IS 575 Information Retrieval
IS 577 Management of Information Technology
IS 596 Topics in Information Systems
SE 430 Object-Oriented Modeling
IS 690 Research Seminar
IS 696 Master's Project
IS 698 Master's Thesis

With the permission of Dr. Martin Kalin, program administrator for CTI, students may also take other graduate courses offered by CTI.
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

ADMISSION REQUIREMENTS
In order to be considered for admission to the doctoral program, students minimally must:

- Hold a master's degree in Computer Science or an allied field.

Students are eligible for early admission to the Ph.D. program through the Software Management Program within the M.S. degree in Software Engineering.

Students without a Masters degree in computer science or an allied field may be considered for conditional admission to the doctoral program. These students must have an exceptional undergraduate record. A conditionally admitted student will be required to complete a doctoral prerequisite phase, consisting of a set of courses determined to be appropriate for the student by the Ph.D. committee. These courses will include the core courses from the Masters of Science in Computer Science. Upon completion of the prerequisite phase, the Ph.D. committee will conduct an evaluation of the student's progress. Assuming such progress is satisfactory, the student is then formally admitted into the doctoral program. **Note:** It is not the policy of the School to award a Masters degree to a student enrolled in the Ph.D. program.

- Submit three letters of recommendation.
- Show definite promise for completing the program.
- Submit a written statement describing their accomplishments, goals and interests.
- Submit a completed application form.
- Submit official score report of the Graduate Record Examination (GRE).

In addition, applicants educated outside of the United States must demonstrate English proficiency with a TOEFL score of 580 or greater.

COMPLETENESS OF CREDENTIALS
When important pieces of information such as transcripts are lacking, the school is compelled by University regulations to reject the application.

The Ph.D. Committee determines which applicants will be admitted to the program. Because the School may only admit a limited number of students of the Ph.D. program, meeting the minimum admission standards does not guarantee acceptance.

DEGREE REQUIREMENTS
The following steps are needed to complete the requirements for the degree. The student must:

- Complete advanced coursework.
- Be admitted to candidacy.
- Complete the dissertation.

These steps are described in detail below.

COURSE REQUIREMENTS
- Ph.D. students with a Masters degree are required to complete a minimum of 60 credits (15 courses) of graduate classes beyond the Masters degree. These credits must include at least 48 credits of coursework in the 420-599 range, including CSC 426 Values and Computer Technology, and 12 credits of CSC 699 Research. Students who do not hold a relevant Masters degree must complete an additional 52 credits (13 courses) of graduate classes, including at least 36 additional credits of courses in the 420-599 range.
- Students may enroll in CSC 699 only after admission to candidacy.
• The written approval of the Ph.D. Committee is required, before registering, to apply courses taught outside the School towards the doctoral program course requirements.

• Students must maintain a grade point average of 3.5 or better to remain in good standing in the program. A course grade below C is unsatisfactory and will not be counted toward degree requirements. The Ph.D. Committee will ask students to withdraw from the doctoral program if the members judge that those students are not progressing satisfactorily toward the degree.

• Prior to admission for candidacy, any student who is not enrolled three consecutive quarters will be dismissed from the program and must apply for readmission. After attaining candidacy, students must be continuously enrolled in each academic quarter until all degree requirements are fulfilled.

ADMISSION TO CANDIDACY

To be admitted to candidacy, doctoral students must complete the following:

Residency. Three quarters of full-time study at DePaul University beyond the master’s level. Full-time study is defined as registration for a minimum of eight credit hours (two courses) per quarter. With prior approval of the Ph.D. Committee, students may satisfy residency requirements by coursework, participation in seminars, or research performed off campus.

Allied Course. Complete CSC 426 Values and Computer Technology.

Doctoral Candidacy Examinations: Pass three Candidacy Area Examinations.

DOCTORAL CANDIDACY EXAMINATIONS

Doctoral candidacy examinations are offered each year in March and August. Applications to take these exams must be completed three months prior to the exam date. A student is allowed at most two attempts at passing a candidacy examination in any area. Any student who fails more than three candidacy examination attempts will be asked to leave the program. Reading lists and previous exams are available in the School office.

Recommended courses for examination preparation are as follows:

ARTIFICIAL INTELLIGENCE
CSC 456 Foundations of Intelligent Databases
CSC 457 Expert Systems
CSC 458 Symbolic Programming
CSC 502 Genetic Algorithms
CSC 556 Foundations of Artificial Intelligence
CSC 578 Neural Networks I
CSC 579 Neural Networks II
CSC 580 Artificial Intelligence Programming
CSC 582 Machine Learning
CSC 583 Natural Language Processing
CSC 585 Knowledge Representation
CSC 587 Cognitive Science
CSC 594 Topics in Artificial Intelligence

COMMUNICATIONS
TDC 432 Computer and Information Systems Modeling
TDC 462 Data Communications
TDC 463 Computer Networks and Data Systems
TDC 489 Queuing Theory with Computer Applications
TDC 513 Client/Server Technologies
TDC 561 Distributed Processing
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

TDC 562 Computer Communication Network Design and Analysis
TDC 563 Protocols and Techniques for Data Networks
TDC 564 Local Area Networks
TDC 566 Integrated Services Digital Networks
TDC 568 Network Management
TDC 593 Topics in Telecommunications
TDC 597 Topics in Data Communications

THEORETICAL COMPUTER SCIENCE
CSC 490 Theory of Computation
CSC 493 Automata Theory and Formal Grammars
CSC 497 Information Theory
CSC 503 Parallel Algorithms
CSC 591 Topics in Algorithms
CSC 599 Topics in Computer Science

COMPUTER INFORMATION SYSTEMS
IS 554 Information Engineering
IS 574 Decision Support Systems and Expert Systems
IS 577 Management of Information Technology
IS 596 Topics in Information Systems
SE 477 Software and Systems Project Management
SE 553 Advanced Topics for Systems Development
SE 558 Software Methodologies

DATA ANALYSIS
CSC 423 Data Analysis and Regression
CSC 424 Advanced Data Analysis
CSC 428 Data Analysis for Experimenters
CSC 598 Topics in Data Analysis

DATABASE SYSTEMS
CSC 451 Database Design
CSC 452 Database Programming
CSC 456 Foundations of Intelligent Databases
CSC 457 Expert Systems
CSC 481 Pattern Recognition and Machine Perception
CSC 549 Advanced Database Systems
CSC 550 Object-Oriented Databases
CSC 589 Topics in Database

OPERATING SYSTEMS
CSC 460 Topics in Operating Systems
CSC 489 Queuing Theory with Computer Applications
CSC 504 Parallel Processing
CSC 546 Operating System Design
IS 572 Computer Security

VISUAL COMPUTING
One of the following two course sequences:
HCl 401 User Interface Design
HCl 506 User Interface Evaluation
CSC 469 Computer Graphics I
CSC 539 Computer Graphics II
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

CSC 481  Pattern Recognition and Image Processing
CSC 584  Computer Vision

One of the following not previously applied above:

HCI 401  User Interface Design
CSC 438  Vision Systems
CSC 469  Computer Graphics I
CSC 481  Pattern Recognition and Image Processing
CSC 498  Digital Signal Processing
CSC 536  Modeling for Computer Aided Design
HCI 506  User Interface Evaluation
CSC 539  Computer Graphics II
CSC 584  Computer Vision

PROGRAMMING LANGUAGES AND ENVIRONMENTS

CSC 434  Object-Oriented Programming
CSC 504  Parallel Processing
CSC 535  Formal Semantics of Programming Languages
CSC 548  Advanced Compiler Design
CSC 599  Topics in Computer Science
HCI 401  User Interface Design

SOFTWARE ENGINEERING

IS 571  Software Maintenance
SE 430  Object-Oriented Modeling
SE 431  Formal Software Specifications and Development I
SE 465  Software Engineering Principles
SE 467  Software Reliability
SE 531  Formal Software Specifications and Development II
SE 533  Software Verification and Validation
SE 558  Software Methodologies
SE 690  Research Seminar

SOFTWARE MANAGEMENT

CSC 428  Data Analysis for Experimenters
IS 427  Software Quality Management
IS 483  Information Systems Management
IS 577  Management of Information Technology
SE 433  Software Testing
SE 468  Software Measurement and Project Estimation
SE 477  Software and System Project Management
SE 529  Software Risk Management

CANDIDACY CONTINUATION

Once admitted to candidacy, the doctoral candidate must maintain registration in the University in each of the quarters of the academic year until the degree requirements have been completed. After the student has completed the 60 required credits, this requirement may be satisfied by registering for CSC 701 Resident Candidacy Continuation. Failure to comply with this policy may result in dismissal from the doctoral program. Students dismissed from the program for this reason need to follow the readmission procedures to be considered for reinstatement in the program.
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

CHOOSING A DISSERTATION AREA

The determination of the research area which will be the basis for the dissertation may require additional class and private study time after passing the Candidacy Area Examinations. This choice should be made carefully since the student will be completing extensive in-depth study in this area.

FINDING A DISSERTATION ADVISOR

Students are encouraged to find an advisor and engage in a research project as early as possible. Once a final research area has been determined, the student must find a member of the School faculty to serve in the capacity of Dissertation Advisor. This faculty member must be willing to commit time and effort to guide the student in further research and assist with the writing of academic papers and the Ph.D. dissertation. While not customary, it is possible to switch dissertation advisors. Both the student and the faculty member are free to terminate this relationship at any time.

BACKGROUND STUDY AND RESEARCH

The Ph.D. student must be thoroughly acquainted with the current scholarly research being performed in a particular area before choosing a dissertation topic in that area. This requires that the student read current papers from academic journals and conferences to become knowledgeable about current research in the particular area which has been chosen. The Dissertation Advisor should be able to help the student in choosing appropriate reading material. In addition, students will often do small projects in the chosen area during this time to become familiar with appropriate research methods. Typically, it may require a year or more of such work to begin to understand the problem domain.

CHOOSING A DISSERTATION COMMITTEE

The student and Dissertation Advisor work together to develop the Dissertation Committee. Three of the members must be full-time faculty members in the School of Computer Science, Telecommunications and Information Systems. The fourth committee member must be a faculty member from outside the division of the research, or a scholar from outside the university whose expertise is pertinent to the topic of the dissertation. The members must be approved by the School's Ph.D. Committee.

ORAL QUALIFYING EXAMINATION

The Oral Qualifying Examination is taken after a student has selected a general topic for the dissertation and done extensive study in that area. This examination will test the student's depth of knowledge in the chosen area. The committee may ask the student any questions about the chosen research area. The student will pass this examination only if the Dissertation Committee agrees that the student has gained sufficient knowledge to proceed to the dissertation proposal. The committee may recommend that the student repeat this examination at a later date or leave the program if they are not satisfied with the current work. This exam must be passed within two years of being admitted to Candidacy.

CHOOSING A DISSERTATION TOPIC

The Ph.D. student, in conjunction with the Dissertation Advisor, must determine an idea for research and study which is likely to provide results which are original and significant. The Ph.D. dissertation must show work which goes beyond what has been done in any other published work and which is important to the field. After choosing a dissertation topic, the student will do further work on the chosen topic to attempt to gain some preliminary research results. Typically 6 months to 1 year of work must be done after the dissertation topic has been chosen before the dissertation proposal should be attempted.
PRESENTATION OF THE DISSERTATION PROPOSAL

Once the student has enough preliminary results that the student and the Dissertation Advisor are confident that the work should result in publishable results, the student will write an extensive review of previous work in the area and a research proposal for the dissertation research. The Dissertation Committee members will then choose a date for the presentation of the proposal. The student will provide an oral presentation of current results and future research goals to the Dissertation Committee.

The proposal will be approved only if the Dissertation Committee agrees that the work which is planned will constitute an acceptable Ph.D. dissertation. The committee may recommend that the student repeat the proposal at a later date or leave the program if they are not satisfied with the current work.

PUBLISHING A JOURNAL OR CONFERENCE PAPER

Except in very unusual situations, every Ph.D. student in the School will be required to publish at least one paper in a refereed journal or conference proceedings before completing the degree. This requires choosing a set of results which will be of interest to the research community, writing these results into a concise academic paper and submitting this paper to a conference or journal. Conference papers must typically be submitted 6 months to 1 year before the conference will be held so they may be reviewed by peer researchers at other universities.

WRITING THE PH.D. DISSERTATION

Ph.D. dissertations are typically 100 to 300 pages in length and must represent a significant and original body of work.

PUBLIC DISSERTATION DEFENSE

After the dissertation has been written, the Ph.D. student will provide a copy to all members of the Dissertation Committee and present the results at a School seminar. The Dissertation Committee must recommend that the defense should proceed prior to scheduling a date for the defense. The members of the Dissertation Committee will determine whether the completed dissertation actually embodies the work which was promised in the dissertation proposal. The committee may recommend modifications or additional research which must be completed before the degree will be granted. Refer to the section on program time limitations below for more information.

PUBLISHING THE DISSERTATION

A bound copy of the dissertation and the abstract must be presented to the DePaul Library where it will be permanently available to current and future DePaul students. Consult the Handbook for Graduate Studies at the back of this bulletin for information on submitting the dissertation and an abstract of it to the School. Contact the Student Services office for additional information regarding procedures to follow for binding the dissertation.

GRADUATION

Candidates for graduation must fill out an application at least three months before the date the degree is expected. Doctoral candidates who have passed the dissertation defense and who have submitted their dissertations to the School become eligible for degree conferral. Consult the Handbook for Graduate Studies at the back of this bulletin for procedures and fees related to graduation.
PROGRAM TIME LIMITATIONS

- There is a time limit of four years between admission to the doctoral program and admission to candidacy.
- There is a time limit of two years between admission to candidacy and passing the oral qualifying examination.
- There is a time limit of not less than eight months and not more than five years between admission to candidacy and the dissertation defense.
- Consult the Handbook for Graduate Studies at the back of this bulletin for graduation application deadlines and the deadline for submitting completed dissertations.
COURSES
All courses carry four hours of credit unless otherwise indicated.

UNDERGRADUATE COURSES
These courses count only for Prerequisite Phase requirements.

ART 105  Two-Dimensional Foundations. Development of perceptual ability through the analysis of two dimensional concepts of line, shape, value texture, color, space, and organization.

ART 260  Graphic Design I. Introduction to graphic design. Projects enable proficiency in type, graphic images, color, and paper selection. Prerequisite: ART 105.

ART 305  Advanced Color Design. Advanced explorations into the use of color in both paint and computer applications. Prerequisite: ART 105.

CSC 203  COBOL Programming. An introduction to programming in the business oriented language COBOL. The emphasis will be on business problems involving the processing of large quantities of data.

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. (Recommended: Students should have completed or be concurrently enrolled in MAT 140.)

CSC 225  C++ for Programmers. Introduction to C++ for persons with previous programming experience in some high-level language other than C or C++. Basic input/output (e.g., cin, cout), variables, operators, control flow, functions, program structure, arrays, pointers, storage classes, type qualifiers, classes, constructors, destructors, introduction to templates, dynamic storage allocation (new, delete). Prerequisite: Experience in at least one high level programming language.

CSC 240  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. Prerequisite: 110 or 150.

CSC 310  Principles of Computer Science I. Conceptual models of a computer, machine and assembly language. Internal data representation, programming methods, recursion, stacks, queues. Prerequisite: CSC 215.

CSC 315  Analysis and Design Techniques. Analyzing a problem requiring a computer-based solution, designing a solution, prototyping the solution in a 4th generation language, testing the prototype. Structured analysis and design techniques, data flow and control flow programming, the data/project dictionary, processing narratives, architectural design, detailed design, transform and transaction flow, program design language, technical reviews, inspections and walk-throughs. Comparison of structured techniques to alternative approaches. A team project will be required to motivate these topics. Prerequisite: CSC 215

CSC 323  Data Analysis and Statistical Software I. Programming in the statistical language SAS. Introduction to data analysis, elementary statistical inference. Regression and correlation. Prerequisites: CSC 310 or CSC 415, and MAT 140.
CSC 343  Introduction to Operating Systems. 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. Prerequisite: CSC 416.

CSC 345  Computer Architecture. Introduction to digital logic; microprogramming; further topics. Prerequisite: CSC 415 or consent.

CSC 373  Information Systems. Development of Information system applications at the strategic, tactical and operational levels. Systems theory and concepts, quality decision-making, the organizational role of information technology, and roles of people using, developing and managing systems. Prerequisite: 240.

CSC 415  Foundations of Computer Science I. Iteration, induction, and recursion; asymptotic analysis; proofs of correctness; elementary combinatorics; sets; propositional logic; predicate logic. Prerequisite: MAT 140 or equivalent.

CSC 416  Foundations of Computer Science II. List, tree and graph abstract data types; templates, inheritance, virtual functions, and abstract classes in C++. Prerequisite: CSC 225 or CSC 310. Co-requisite: CSC 415.

CSC 417  Foundations of Computer Science III. Hash table data model; self-balancing trees; set data model; regular expressions; context-free grammars; finite state automata. Prerequisite: CSC 416.

MAT 140  Discrete Mathematics I. Boolean Algebra, graph theory, and combinatorial analysis with computer applications. Prerequisite: 131 or three years of high school mathematics.

MAT 145  Calculus for Information Systems. Limits, continuity, the derivative and rules of differentiation, applications of the derivative, exponential and logarithm functions, the definite integral and some methods of integration, improper integrals. Prerequisite: MAT 141.

MAT 150  Calculus I. Limits and derivatives, extrema, curve sketching, convexity, inverse functions, continuity. Prerequisite: MAT 131 or three years of high school mathematics.

MAT 151  Calculus II. Definite and indefinite integral; volume; arc length; trigonometric functions; logarithmic and exponential functions. Prerequisite: MAT 150.

MAT 220  Linear Algebra with Applications. (For non-mathematics majors.) Systems of linear equations, matrices and matrix algebra, determinants, applications to linear programming, graph theory, etc. Prerequisite: MAT 151.

PHY 405  Physical Principles of Telecommunications. The course intended for non-majors treats the basic concepts of physics on which communications are based, such as basic electricity, circuit elements, transmission lines, and fibers. Included will be a discussion of combinational and sequential digital circuits. The format consists of lecture and laboratory exercises. Prerequisite: Mathematics 151 or equivalent.

PSY 105  Introductory Psychology I. History and present status of psychology; statistics as a research tool; human development; learning, memory, and intelligence; personality, stress and coping; social psychology. 105 and 106 will include a research participation requirement of no more than six hours.

PSY 347  Social Psychology. Survey of social psychological theory and research on how individual behavior, thoughts and feelings are influenced by the social context in which they occur. Prerequisite: PSY 105 or 106.
COURSE DESCRIPTIONS

PSY 380  Industrial and Organizational Psychology. Application of theories and methods of psychology to the study of human behavior in business, industrial and other organizations. **Prerequisite:** PSY 105 or 106.

PSY 383  Engineering Psychology (crosslisted with PSY 443). Application of experimental psychology and individual differences to the design of man-machine systems, work environments, and living environments. **Prerequisite:** PSY 380 or consent.

GRADUATE COURSES

COMPUTER SCIENCE COURSE OFFERINGS

Completion of the Prerequisite Phase is required for all courses not listing specific prerequisites.

CSC 423  Data Analysis and Regression. Multiple regression and correlation, residual analysis, analysis of variance, and robustness. These topics will be studied from a data analytic perspective, supported by an investigation of available statistical software. **Prerequisite:** CSC 323 or consent.

CSC 424  Advanced Data Analysis. Topics chosen from among discriminant analysis, principal components analysis, factor analysis, and non-parametric statistics. **Prerequisite:** CSC 423 or consent.

CSC 426  Values and Computer Technology. The impact of computerized technologies on society with particular attention paid to the ethical issues raised by these social effects. The course will require of all Ph.D. students research leading to a paper of publishable quality. Techniques for this type of research and writing will be discussed. An oral presentation of the research of that paper will also be required.

CSC 428  Data Analysis for Experiments. The analysis of experiments in the computing science with special emphasis on the use of statistical software and interpretation of generated output. **Prerequisite:** CSC 423.

CSC 434  Object-Oriented Programming. An introduction to object-oriented concepts and programming. Object-oriented applications, object-oriented database systems, architectural issues in object-oriented systems, and areas of research in object-oriented systems will be examined.

CSC 436  Foundations of Visual Computing. Mathematical and physical notions that underpin computer vision graphics. Topics will include approximation, interpolation, linear shift invariant systems, transforms for signal and analysis, radiant sources, photometry. **Prerequisite:** MAT 150, 151 or 145.

CSC 444  Automata Theory and Formal Grammars (formerly CSC 493). An introduction to the most important abstract models of computation and their applications: finite state machines and pushdown automata. The relationship between formal grammars and automata.


CSC 448  Compiler Design. Design and structure of high level languages. Lexical scan, top down and bottom up syntactic analysis. Syntax directed translation and LR(k) grammars. **Prerequisite:** CSC 447 or consent.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 449</td>
<td>Database Technologies</td>
<td>An introduction to database technology and systems including: database architecture, data models, query languages, integrity, security, functional dependency and normalization. Prerequisite: CSC 311 or 415.</td>
<td></td>
</tr>
<tr>
<td>CSC 451</td>
<td>Database Design</td>
<td>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. Prerequisites: CSC 449, a programming language.</td>
<td></td>
</tr>
<tr>
<td>CSC 452</td>
<td>Database Programming</td>
<td>Programming in large-scale relational database environment using host languages such as C. Design and implementation of online applications and report generations. Micro-computer Database System programming. Concepts such as database integrity, transactions, transaction recovery, concurrency and record locking will be covered. Prerequisites: CSC 449, 215.</td>
<td></td>
</tr>
<tr>
<td>CSC 456</td>
<td>Foundations of Intelligent Databases</td>
<td>An introduction to the use of logic and deduction in databases and artificial intelligence. Topics will include propositional logic, first order predicate calculus, resolution theorem proving, deductive retrieval and deductive databases, inference engines, logic programming, and truth maintenance systems.</td>
<td></td>
</tr>
<tr>
<td>CSC 457</td>
<td>Expert Systems</td>
<td>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 frames and other knowledge-representation techniques, rule-based and case-based systems, inference, and model-based reasoning.</td>
<td></td>
</tr>
<tr>
<td>CSC 458</td>
<td>Symbolic Programming</td>
<td>Basic concepts of symbolic programming as embodied in the language LISP. Techniques for prototyping and building conceptually advanced systems in an environment that encourages procedural and data abstraction. Topics include basic programming techniques, symbolic expressions, recursion, advanced data and control structures, object-oriented programming in CLOS, and symbolic control of TCP/IP connections, MIDI sequencing, text-to-speech, and speech recognition. Assignments will focus on basic AI techniques, but the class is intended for anyone who will need to rapidly develop large complex systems.</td>
<td></td>
</tr>
<tr>
<td>CSC 470</td>
<td>Survey of Computer Graphics</td>
<td>Overview of selected 2D techniques including compositing, and morphing, and a survey of basic 3D techniques, including interaction of light and color. Multimedia. Virtual Reality. Students write parts of a raytracer, and create an animation. Prerequisite: CSC 415.</td>
<td></td>
</tr>
<tr>
<td>CSC 481</td>
<td>Pattern Recognition and Image Processing</td>
<td>Image processing, edge detection, segmentation, feature extraction, decision boundaries, Bayesian classifiers, nearest neighbor classifiers, clustering, neural nets. Prerequisite: one statistics course.</td>
<td></td>
</tr>
</tbody>
</table>
CSC 485 **Numerical Analysis.** Use of a digital computer for numerical computation. Error analysis, Gaussian elimination and Gauss-Seidel method, solution of nonlinear equations, function evaluation, approximation of integrals and derivatives, Monte Carlo methods. **Prerequisites: MAT 220 and a programming course.**

CSC 486 **Advanced Numerical Analysis.** Theory and algorithms for efficient computation, including the Fast Fourier Transform. Numerical solution of nonlinear systems of equations. Minimization of functions of several variables. Sparse systems of equations and corresponding eigenvalue problems. **Prerequisite: CSC 485.**

CSC 487 **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. **Prerequisites: MAT 220 and any introductory programming course.**

CSC 488 **Operations Research II.** Optimization Theory. Integer programming; nonlinear programming; dynamic programming; game theory. **Prerequisite: CSC 487.**

CSC 491 **Design and Analysis of Algorithms.** Methods of designing algorithms including divide-and-conquer, the greedy method, dynamic programming, and backtracking. Emphasis on efficiency issues. **Prerequisite: CSC 416 and 417 or instructor consent.**

CSC 496 **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: one assembler course.

CSC 497 **Information Theory.** An introduction to the basic concepts of information theory and coding theory. Measure of information, the fundamental theorem, Hamming, BCH, and other cyclic codes.

CSC 498 **Digital Signal Processing.** Elements of circuit and signal theory, theory of modulation, mathematical basis of sampling and coding, principles of digital filtering. Applications to communications, process control, image and voice recognition, voice synthesis.

CSC 502 **Genetic Algorithms.** The basics of genetic algorithms, the schema theory of John Holland, advanced operators and genetic search, as well as applications, e.g. genetic-based machine learning, parsing, expert system, etc. Students will work on a variety of projects based on the applications discussed in class. **Prerequisite: CSC 491.**

CSC 503 **Parallel Algorithms.** Development, implementation, and applications of parallel algorithms. Models of parallel computation. Parallel sorting, searching and graph algorithms, as well as other parallel algorithms, will be studied and implemented on both simulated and actual parallel machines. **Prerequisite: CSC 491.**

CSC 504 **Parallel Processing.** Specific multiprocessor architectures and how to implement various algorithms on each machine. Students will implement a fairly large project on a multiprocessor. The course will also introduce some compilation techniques, for a better understanding of the issues. **Prerequisite: CSC 491.**


CSC 538  *Vision Systems.* A survey of working vision systems such as bar code readers, handwriting readers, robotic navigation systems, target acquisition and tracking systems. *Prerequisite:* CSC 481 or CSC 584.


CSC 544  *Theory of Computation* (formerly CSC 490). Advanced topics in the mathematical foundations of computation. Topics may include random access and Turing machines, recursive functions, algorithms, computability and computational complexity, intractable problems, NP-complete problems. *Prerequisite:* CSC 444.

CSC 545  *Advanced Computer Organization.* Parallel, array and pipeline processors and other topics of current interest. *Prerequisite:* CSC 345.

CSC 546  *Operating Systems Design.* A project/seminar oriented course examining the details of the design of operating systems. The ideas from CSC 446 will be extended and incorporated into the design details. *Prerequisite:* CSC 343.

CSC 548  *Advanced Compiler Design.* Emphasis on practical problems in implementing compilers, data flow analysis, code optimization, error analysis. Discussion of compiler generators. As a class project, students will write a compiler. *Prerequisite:* CSC 448.

CSC 549  *Advanced Database Systems.* Physical data organization and database indexes. Query processing and optimization. Failure and recovery in database systems. Concurrency control and transaction management. Selected topics: intelligent databases, temporal databases, multimedia databases, spatial databases, fuzzy databases, etc.


CSC 551  *Distributed Database Systems.* Distributed database architecture, distributed database design, distributed query processing, query decomposition and optimization of distributed queries, distributed transaction management and concurrency control, distributed DBMS reliability, distributed database operating systems. Distributed multidatabase systems. Client/Server database systems. *Prerequisite:* CSC 449 and TDC 462.

CSC 556  *Foundations of Artificial Intelligence.* A survey of the fundamental techniques used in artificial intelligence. Heuristic search, game playing, means-ends analysis and classical planning, constraint propagation, natural language understanding, and systems that learn. An introduction to intelligent interfaces, intelligent agents, and modeling human cognition with AI systems. *Prerequisite:* CSC 456, CSC 457 or CSC 458 or consent.
**COURSE DESCRIPTIONS**

**CSC 570** **Visualization.** Reconstruction techniques. Voxel classification and isosurface generation. Spatial set operations. Projections of higher-dimensional data sets. Data feature enhancement. False color mapping. Survey of applications in science, engineering and medicine. **Prerequisites: CSC 469 and CSC 436.**

**CSC 578** **Neural Networks I.** A study of the basic structure of neural networks, activation and weights computation, learning, and various models: competition, pattern association, supervised and unsupervised learning units, single and multi layer models, Hopfield nets, Boltzmann machines, and others. Some current applications are explored. **Prerequisite: MAT 150, 151 or 145.**

**CSC 579** **Neural Networks II.** Advanced neural network architectures: Kohonen Networks, Counter Propagation Networks, Bi-directional Associative Memories as well as Art1 and Art2 Networks. Professional Neural Network development tools will be used throughout the course. There will be a project. **Prerequisite: CSC 578 and MAT 150, 151 or 145.**

**CSC 580** **Artificial Intelligence Programming.** System implementation, using the powerful procedures and structures of modern AI such as: slot and filler databases, unification pattern matching, heuristic search, deductive information retrieval, procedures as data, case-based reasoning, natural language understanding, logic programming, discrete networks, and constraint satisfaction. **Prerequisite: CSC 458.**

**CSC 582** **Machine Learning.** An introduction to computer systems that learn. Classification methods, decision-tree induction methods, learning concepts from examples, learning heuristics, learning by analogy, explanation-based and case-based learning. Cognitive models. **Prerequisite: CSC 456.**

**CSC 583** **Natural Language Processing.** Introduction to computer understanding of natural (human) languages. Topics include knowledge representation, syntactic analysis and grammars, parsing, semantic interpretation, discourse analysis, text generation, and machine translation. An overview of several existing natural language processing systems. **Prerequisite: 417 or consent of instructor.**

**CSC 584** **Computer Vision.** An introduction to computer vision, including image representation, segmentation, stereo, color, texture perception, motion, knowledge representation, and neural nets. **Recommended: CSC 436 or CSC 481.**

**CSC 585** **Knowledge Representation.** Techniques for symbolic representation of knowledge in artificial intelligence and knowledge-based systems. Topics will include propositional logic, predicate calculus, nonmonotonic logics, semantic networks and frames, conceptual dependencies and scripts, truth maintenance systems, and qualitative reasoning. **Prerequisite: CSC 456.**

**CSC 587** **Cognitive Science.** Introduction to the principles and methods of cognitive psychology, and the relation between psychology and artificial intelligence; in particular, the use of AI systems to model human cognition. An overview of AI systems that have been intended as cognitive models, such as ACT* and SOAR. Emphasis on information processing. Applications to human/computer interaction. **Prerequisite: consent of the instructor. Independent study form required.**

**CSC 589** **Topics in Database.** **Prerequisite: consent of the instructor. Independent study form required.**

**CSC 590** **Topics in User Interfaces.** **Prerequisite: completion of the corresponding visual computing core sequence or consent of instructor. May be repeated for credit.**
CSC 591  **Topics in Algorithms.** An in-depth discussion of one or more of the following topics: algorithms for integer operations, polynomial arithmetic including applications of the fast Fourier transform, matrix operations, pattern matching algorithms, proving lower bounds on the complexity of algorithms, parallel algorithms, approximation algorithms. **Prerequisite:** CSC 491.

CSC 592  **Topics in Computer Vision and Pattern Recognition.** Prerequisite: completion of the corresponding visual computing core sequence or consent of instructor. May be repeated for credit.

CSC 594  **Topics in Artificial Intelligence.** Prerequisite: consent of instructor. Independent Study form required.

CSC 595  **Topics in Graphics.** Prerequisite: completion of the corresponding visual computing core sequence or consent of instructor. May be repeated for credit.

CSC 598  **Topics in Data Analysis.** Prerequisite: consent of instructor. Independent Study form required.

CSC 599  **Topics in Computer Science.** Prerequisite: consent of instructor. Independent Study form required.

CSC 610  **Computer Science 1.** An introduction to structured programming using PASCAL. Topics include: elementary data types, program control structures, character strings, array processing, procedures and functions, and an introduction to user-defined data types.

CSC 611  **Computer Science 2.** Conceptual models of a computer, machine and assembly language. Internal data representation, programming methods, recursion. Basic data structures, stacks, queues, linked lists. Trees, tree searches and string processing. **Prerequisite:** CSC 610.

CSC 630  **Computers in Education.** An introduction to computers in education. A survey of software and hardware available for educational purposes. Hands-on experience with microcomputers. How to evaluate educational software.

CSC 640  **Teaching Computer Science.** 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. **Prerequisite:** CSC 611.

CSC 670  **Computer-Assisted Instruction.** Study and analysis of the use of the computer as an aid in instruction. Use of CAI languages such as PILOT. **Prerequisite:** CSC 630.

CSC 671  **Quantitative Computing Workshop.** Quantitative computing background needed for graduate study complemented with application to useful problems using appropriate software tools.

CSC 672  **Data Analysis Workshop.** Statistical background needed for graduate study complemented with experience in data analysis using SAS. **Prerequisite:** CSC 671 or equivalent.

CSC 680  **Programming with LOGO.** An introduction to LOGO, a powerful yet easy-to-learn language that both adults and children can use to express ideas.

CSC 690  **Research Seminar.** Readings and discussion on current research topics. Students may register for this course no more than twice. **Prerequisite:** consent of the instructor.
COURSE DESCRIPTIONS

CSC 696 Master's Project. Four credit hours. Students may register for this course only after their advisor has approved a written proposal for their project. Prerequisite: consent of advisor. Independent study form required.

CSC 698 Master's Thesis. Two credit hours. Students may register for this course only after their advisor has approved a written proposal for their thesis. Students must continue to register for this course every quarter after their first registration until they complete their project or thesis to the satisfaction of their advisor. They earn two hours of credit for each such registration but only four hours of credit will apply for degree credit. Prerequisite: consent of advisor. Independent study form required.

CSC 699 Research. Prerequisite: One to 12 hours per quarter. A total of 12 hours is required. Prerequisite: Pass Candidacy Examination in three concentration areas.

CSC 701 Resident Candidacy Continuation. Non-credit. Students admitted to candidacy for the doctoral degree who have completed all course and dissertation registration requirements and who are regularly using the facilities of the University for study and research are required to be registered each quarter of the academic year until the dissertation and final examination have been completed. Prerequisite: Admission to Candidacy Independent Study form required.

CSC 702 Non-Resident Candidacy Continuation. Non-credit. This registration provides for doctoral candidates who have been admitted to candidacy who are not in residence and need only occasional use of University facilities, including the libraries. Prerequisite: Admission to Candidacy Independent Study form required.

DISTRIBUTED SYSTEMS COURSE OFFERINGS
Completion of the prerequisite competencies is required for all courses not listing specific prerequisites.

DS 420 Foundations of Distributed Systems. An examination of current software architectures (e.g., client/server), protocols (e.g., LDAP, OpenDoc, DCOM/ActiveX, CORBA), and tools (e.g., Java RMI) for distributed systems. Platform, performance, and concurrency issues. Overview of development tools.

DS 513 Client/Server Technologies. A study of DCE technologies that provide an infrastructure for distributed computing under the client/server model. RFC, Kerberos, global and cell directory services, threads. Programming and administrative issues. This course involves programming. Prerequisite: TDC 561 and Network Programming.

DS 520 Distributed Systems Practicum. Design and implementation of servers, with emphasis on active control technologies such as ActiveX and JavaBeans for n-tier client/server systems. Network-based software distribution. Distributed data access through LDAP, ODBC, and related technologies. Projects will be done in leading-edge languages and tools such as Visual Basic, Java, Power Builder, and Visual C++. Prerequisite: DS 400, CSC 449.

DS 594 Distributed Systems Project. Design, justification, implementation, and performance analysis of a distributed system. Team-based projects that use a variety of tools are encouraged. Prerequisite: DS 520, SE 450.

DS 599 Topics in Distributed Systems. Prerequisite: consent of instructor. Independent Study form required.
COURSE DESCRIPTIONS

HUMAN-COMPUTER INTERACTION COURSE OFFERINGS

Completion of the prerequisite competencies is required for all courses not listing specific prerequisites.

HCI 400  Analysis and Design for HCI. Introduction to the relation between psychology and human-computer interaction. Understanding users and tasks in the context of the work environment. Prerequisite: CSC 150, 240, PSY 105.


HCI 410  Introduction to Human-Computer Interaction. The user-interface development process. The user/task/work environment analysis. Low-fidelity prototyping techniques. User interface design principles. User interface styles including menus, command languages, form fill-in, direct manipulation and natural language. Prerequisites: Consent, HCI 400, ART 461, PSY 680.


HCI 430  Prototyping for Human-Computer Interaction I. Introduction to creating prototypes for HCI systems. Discusses modern user interface programming tools (VB, Access, etc). The emphasis is on creating testable prototypes and evaluating these prototypes. Converting the prototype to a final working system is discussed. Students create a prototype for a predefined system, evaluate the prototype, redesign the system as necessary, and convert it to a final working system. Students prepare written documents describing their activities and present the final results to the class. Prerequisite: HCI 410 or permission of the instructor.

HCI 460  Evaluating Human-Computer Interaction. Techniques of heuristic evaluation, usability testing and formal experimentation. Students take a prototype interface from a first implementation through evaluation. Prerequisite: a statistics course.


HCI 511  Designing for Disabilities. Designing computer-based solutions for problems faced by people with disabilities. Designing for both physical and cognitive disabilities. Solutions include text enlargement, enhanced audio, custom presentation of information, and unique input devices. Prerequisites: HCI 410 and HCI 460.
COURSE DESCRIPTIONS

HCI 512  **Designing for Visualization.** Sources of graphical integrity and sophistication. Data-Ink maximization. Data density. Color and information. Effective use of space and time. **Prerequisites:** HCI 410 and HCI 460.

HCI 540  **User Interface Implementation I.** Converting prototypes into running systems. The focus is on using a User Interface Management System, learning the underlying programming language, and the underlying programming environment. Students work on a project that requires pushing the UIMS beyond its normal limits. TAE+, Galaxy, DevGuide, C, C++, Tcl/tk. Students present their final results to the class. **Prerequisite:** CSC 417 or equivalent.

HCI 590  **Topics in Human-Computer Interaction.** Prerequisite: completion of the HCI core courses or consent of the instructor. May be repeated for credit.

HCI 594  **Human-Computer Interaction Capstone.** HCI 594 provides an opportunity for students to apply all of the skills they have learned on one comprehensive project. Multidisciplinary teams design, evaluate, and implement a user interface intensive project. Students prepare documents describing their activities and present the final results to the class. **Prerequisite:** completion of the HCI core courses or consent of the instructor.

INFORMATION SYSTEMS COURSE OFFERINGS

*Completion of the Prerequisite Phase is required for all courses not listing specific prerequisites.*

IS 427  **Software Quality Management.** Quality management principles, tools, and methods applied to the software development process. Selected techniques for continuous and incremental improvements in product and process such as defect analysis, control charts, risk assessment, quality control, quality improvement programs, quality function deployment, the capability maturity model, cleanroom engineering, and benchmarking. **Prerequisite:** CSC 323.

IS 475  **Information Systems Analysis and Design.** Information systems development emphasizing the application of structured techniques in a CASE and 4GL environment. Topics and team project tasks include CASE tools, entity-relationship diagramming, data-flow diagramming, structure chart, action diagram, joint application design, prototyping, design of relational database, and testing. **Prerequisite:** CSC 315 or instructor consent.

IS 481  **Software and Systems Project Documentation.** Creating documentation for software, systems, or telecommunications projects. Development and delivery of documents (paper and web-based) that present products and systems effectively to complex audiences. Documents include planning documents, vision statements, requirements specifications, status and milestone reports, user test plans, and user documentation. Emphasis on constructing electronic documents, appropriate content and hyperstructures for specific purposes and readers, and textual interactivity. Discussions on versioning and intellectual property issues. Presenting highly technical issues to business audiences.

IS 482  **Legal Aspects of Data Processing.** A practical survey of computer and data processing law arising in a high-tech environment. Areas covered include: contracts, copyrights, patents, trade secrets, trademarks, crime, unfair competition and international treaties.


IS 553 Advanced Topics for System Development. Planning and implementation of strategic systems in the context of enterprise transformation and new market dynamics. Networked enterprise and virtual organizations. Internet and intranet applications for electronic commerce, mass customization and information empowerment. Enterprise-wide systems, business process reengineering, inter-organizational systems, sourcing options, and transformational information technologies. Value-chain analysis and competitive strategies. Case studies examine various planning and implementation approaches and impacts. Prerequisite: IS 475, SE 465 or instructor consent.


IS 555 Design and Strategies for Internet Commerce. An integrated study of design, technical, and strategic issues for Internet commerce. Web analysis, design and publishing, Visual, textual and content organization, response time, usability testing, Authorizing tools and administering web server, Internet database servicing, Internet service providers and pricing, Digital cash and encryption, Impact on the value chain, intermediation, and market structure. Strategies for mass customization, interactive marketing, and support for collaborative work. Prerequisite: IS 475 or instructor consent.


IS 572 Computer Security. Security issues and problems specific to the computer environment. Software and hardware protection mechanisms including encryption and authorization schemes. Special security problems in distributed and teleprocessing environments. Prerequisite: CSC 446 or consent.

IS 574 Decision Support Systems and Expert Systems. Analysis, design and implementation of systems for decision support and strategic planning, including decision support systems (DSS), group decision support systems (GDSS), expert systems (ES), executive information systems (EIS), and other applications of artificial intelligence. Case studies, projects on applications, and evaluation of software. Prerequisite: IS 475 or SE 465.
IS 575  Information Retrieval. Introduction to the design and analysis of computer-based information storage and retrieval systems. Retrieval systems using natural language, question-answering techniques. Storage and retrieval of unstructured and well-structured data. On-line inventory systems and bibliographic search systems. Prerequisite: CSC 459 or consent.

IS 577  Management of Information Technology. The focus of this course is on the management of information technology and related resources from a broad strategic perspective. Assessment of Information Technologies and trends, portfolio resources, technology transfer, strategic applications, and strategic Information Technology planning. Prerequisite: IS 475 or SE 465 or completion of Core Knowledge phase in Telecommunications.

IS 596  Topics in Information Systems. Prerequisite: consent of instructor. Independent Study form required.

IS 690  Research Seminar. Readings and discussion on current research topics. Students may register for this course no more than twice. Prerequisite: consent of the instructor.

IS 696  Master's Project. Four credit hours. Students may register for this course only after their advisor has approved a written proposal for their project. Prerequisite: consent of advisor. Independent study form required.

IS 698  Master's Thesis. Two credit hours.. Students may register for this course only after their advisor has approved a written proposal for their thesis. Students must continue to register for this course every quarter after their first registration in it until they complete their project or thesis to the satisfaction of their advisor. They earn two hours of credit for each such registration but only four hours of credit will apply for degree credit. Prerequisite: consent of advisor. Independent study form required.

SOFTWARE ENGINEERING COURSE OFFERINGS
Completion of the Prerequisite Phase is required for all courses not listing specific prerequisites.


SE 420  Object-Oriented Design. Techniques and guidelines for designing large-scale software systems in C++ that aim to create highly maintainable, and highly testable software architectures. Techniques discussed include: logical and physical organization and levelization, incrementations of classes. Using templates and C++ Standard Templates Library. Prerequisite: CSC 416.

SE 430  Object-Oriented Modeling. Object-oriented modeling techniques for analysis and design. Emphasis on one approach and a survey of several alternative approaches, for example, Codd and Yourdon, Booch, Rumbaugh, and Shlaer and Mellor. Relationship between these modeling techniques and the features of object-oriented languages including C++. Team project. Prerequisite: CSC 315.

SE 431  Formal Software Specifications and Development I. This course will focus on practical applications of formal software specification and design techniques. Topics include a survey of formal specification approaches and languages, model-oriented specifications, design refinement, and supporting tools for formal software development. Prerequisite: SE 465.
SE 433 **Software Testing.** Software testing strategies. Designing test plans and test cases. Design reviews, walkthroughs, and inspections. Configuration management. **Prerequisite:** CSC 315.

SE 450 **Object-Oriented Software Development.** Fundamentals of object-oriented programming using Java. Principles and techniques of applying object-oriented analysis, design, patterns, and frameworks. **Prerequisite:** CSC 416.

SE 451 **Distributed Software Development.** Fundamentals and techniques of developing distributed and concurrent applications using Java. Concepts and language constructs covered include: threads, synchronization, communication, remote method invocation. Focus on pattern-based approach to address the problems in distributed and concurrent applications, including safety, liveliness, state-dependent actions, and concurrency control. **Prerequisite:** SE 450.

SE 455 **Software Development Methods.** Techniques for designing, implementing and testing large-scale software systems, as well as principles and methods for developing high quality software systems. Object-oriented technology and its applications. Topics include: object-oriented design methods and notations, object-oriented programming and testing, formal specifications, and programming methodologies. **Prerequisites:** CSC 417 and CSC 447 or SE 430.

SE 465 **Software Engineering Principles.** Survey of fundamental concepts and principles in software engineering. Requirements analysis and software specification, requirements validation and prototyping, and formal specifications. Software design. Software testing. Software project measurements and management. Social issues and ethics. Students will work on team projects. **Prerequisite:** CSC 315.

SE 466 **Software Engineering Projects.** Emphasize on team work, application of development and management techniques and use of CASE tools. The projects involve requirements analysis, requirements validation and inspection, object-oriented design, implementation, testing, integration, demonstration, and presentation. **Prerequisite:** SE 465.

SE 467 **Software Reliability.** The practical application and theory of software reliability models. Classification and comparison of software reliability models. Parametric estimation. **Prerequisites:** CSC 323 and MAT 145.

SE 468 **Software Measurement and Project Estimation.** Software metrics. Productivity, effort and defect models. Software cost estimation. **Prerequisites:** CSC 423 and either SE 465 or IS 475.

SE 469 **Software Safety.** Managing safety, the safety process, hazard analysis models and techniques, designing for safety, verification of safety. **Prerequisite:** SE 465 or consent.

SE 477 **Software and Systems Project Management.** Planning, controlling, organizing, staffing and directing software development activities or information systems projects. Theories, techniques and tools for scheduling, feasibility study, cost-benefit analysis. Measurement and evaluation of quality and productivity. **Prerequisite:** SE 465 or IS 475.
**Course Descriptions**

**SE 480**  
*Software Architecture.* Software architecture is a critical aspect of complex software systems. A system's architectural design is concerned with describing its decomposition into computational elements and their interactions. Architectural design tasks involve system decomposition; global control structures; protocols for communication, synchronization, data access; physical distribution of components; performance tuning; defining evolution paths; and selecting design alternatives. Major issues addressed include: architectural description, formal underpinnings, design guidance, domain-specific architecture, tools and environments. **Prerequisite: SE 430.**

**SE 491**  
*Software Engineering Studio.* Students will work in small teams to develop realistic software systems in a master-apprentice environment. The instructor will serve as a master/mentor/project leader. Students will apply knowledge and skills they have learned in previous course in solving real world problems. The projects may last more than a quarter. Students must register for SE 692 Software Engineering Studio Continuation in each subsequent quarter. **Prerequisite: SE 450 or SE 455.**

**SE 529**  
*Software Risk Management.* Identification, estimation, evaluation, planning, controlling, and monitoring of risk involved in the development, maintenance, operation and evolution of systems. **Prerequisites: CSC 323, SE 465 or IS 475.**

**SE 531**  
*Formal Software Specifications and Development II.* Techniques for specifying software requirements using formal language. Model-based and algebraic formal specifications. Cleanroom software development. Application of formal methods in real software development projects. **Prerequisites: SE 431.**

**SE 533**  
*Software Validation and Verification.* Techniques, methods and tools for software inspection and testing. Theory and applications of formal verification of programs. Techniques and tools for automated analysis of programs. **Prerequisite SE 465 or IS 475.**

**SE 558**  
*Software Methodologies.* Recently developed techniques for software requirements analysis, specification, and design. **Prerequisite: SE 465 or IS 475.**

**SE 690**  
*Research Seminar.* Readings and discussion on current research topics. Students may register for this course no more than three times. **Prerequisite: consent of the instructor.**

**SE 692**  
*Software Engineering Studio Continuation (1 credit hour).* Students register for continuation credit after registering for SE 491 in each subsequent quarter until they complete their studio project. Students who fail to do so will have to reregister for SE 491 to meet the requirement for completing that course. **Prerequisite: SE 491.**

**SE 696**  
*Master's Project.* Four credit hours. Students may register for this course only after their advisor has approved a written proposal for their project. **Prerequisite: consent of advisor. Independent study form required.**

**SE 698**  
*Master's Thesis.* Four credit hours. Students may register for this course only after their advisor has approved a written proposal for their thesis. **Prerequisite: consent of advisor. Independent study form required.**
COURSE DESCRIPTIONS

SE 699  
Software Engineering Research Continuation (1 credit hour). Students register for continuation credit after registering for SE 698 in each subsequent quarter until they complete their thesis. Students who fail to do so will have to reregister for SE 698 to meet the requirement for completing that course. Prerequisite: SE 698.

TELECOMMUNICATIONS AND DATA COMMUNICATIONS COURSE OFFERINGS

Completion of the Prerequisite Phase is required for all courses not listing specific prerequisites.

TDC 411  
Computers in Information Systems and Telecommunications. An introduction to computer organizations and operating systems. Computer components and functions, logic circuits, internal processing, multiprogramming, timesharing, memory management, file management, interrupts and I/O peripheral devices. Prerequisite: CSC 215.

TDC 432  

TDC 461  
Basic Communication Systems. A history of telecommunications and regulatory and regulatory agencies. The basic communication model and its application to different communication systems, communication models. The telephone architecture, a typical data communication system, common carrier services, mediums and their characteristics. Prerequisites: PHY 405 and TDC 411 are recommended.

TDC 462  
Data Communications. 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. Prerequisite: TDC 411 or CSC 345, MAT 145, CSC 323.

TDC 463  
Computer Networks and Data Systems. A detailed discussion of the seven layers of the ISO reference model. The design of interfaces and protocols. Network protocol organization will be discussed using TCP/IP and OSI protocols as examples. Prerequisite: TDC 411 or CSC 343.

TDC 464  

TDC 476  

TDC 489  

TDC 511  
Telecommunications Practicum. Introduction to the functionality and management of voice and data communications equipment in the Telecommunications and Local Area Networks laboratories. Emphasis will be on practical understanding and experience through laboratory exercises. Prerequisite: Completion of the Core Phase.
TDC 512  **Cellular and Wireless Telecommunications.** An overview of cellular telephony including regulatory framework, RF design and frequency reuse, signalling and wireline interconnection issues. Personal Communications Systems (PCS), mobile radio, satellite and paging systems will also be considered. **Prerequisite:** TDC 464.

TDC 513  **Client/Server Technologies.** A study of DCE technologies that provide an infrastructure for distributed computing under the client/server model. RPC, Kerberos, global and cell directory services, threads, Programming and administrative issues. This course involves programming. **Prerequisites:** TDC 561.

TDC 514  **Computer Telephony.** A study of enabling technologies allowing the integration of voice communications services with personal computers, LANs and mainframes. Telephony programming interfaces, call management software, intelligent fax/data retrieval and interactive voice response systems will be considered. **Prerequisites:** TDC 463 and TDC 464.

TDC 561  **Network Programming.** A high-level understanding of network architectures and distributed applications; client/server models; remote procedure call; examples of applications such as electronic mail and file transfer; network programming. **Prerequisite:** TDC 463, CSC 416.

TDC 562  **Computer-Communication Network Design and Analysis.** Quantitative approaches to the design of data communications networks. Practical examples of networks. Statistical multiplexing and buffering at communication concentrators. Topics in overall network design. **Prerequisites:** TDC 432, TDC 462, or consent.

TDC 563  **Protocols and Techniques for Data Networks.** Packet communications; transport protocols; terminal, file transfer, and remote job protocols; packet broadcast protocols; security; database management in distributed networks. **Prerequisite:** TDC 463 or consent.

TDC 564  **Local Area Networks.** A detailed discussion of the current standards and technology. Medium access techniques, topologies, network operating systems, applications, and an introduction to several commercial and research networks. **Prerequisite:** TDC 462, 463.

TDC 565  **Voice and Data Integration.** Methods for data transmission and switching over Wide Area Network telecommunications facilities. DDS and T1 networking. Alternate voice digitization techniques. Microwave, satellite and fiber optic transmission systems. Structure and evolution of the digital telecommunications network. **Prerequisites:** TDC 462 and TDC 464.

TDC 566  **Integrated Services Digital Networks.** A study of the Integrated Services Digital Network (ISDN) including its structure, services and protocols. How current network switching and transmission methods must be modified and expanded to allow integration of voice and data services. A survey of current LEC and IXC ISDN offerings. Future trends in Integrated communication networks. **Prerequisites:** TDC 463 and TDC 464.
TDC 567 Telecommunication Systems Design and Management. The theory and practice of Telecommunication system design. Ongoing systems management. Telecommunication management including selection of vendors/systems, structuring an RFP systems proposal analysis, computer aided telecommunications management. Telecommunication management strategies from a business perspective. Prerequisite: TDC 464. TDC 565 is recommended.

TDC 568 Network Management. Data network management systems. Fault, accounting, configuration, performance and security management using SNMP and other protocols. Prerequisite: TDC 462 and 463. TDC 561 is recommended.


TDC 572 Network Security. Computer communications system security issues, including private and public key encryption and key distribution, challenge and authorization protocols, and password management issues. Security issues in file transfer and sharing, electronic mail, and network management applications.

TDC 593 Topics in Telecommunications. Prerequisite: consent of instructor. Independent study form required.

TDC 597 Topics in Data Communications. Prerequisite: consent of instructor. Independent Study form required.

TDC 690 Research Seminar. Readings and discussion on current research topics. Students may register for this course no more than twice. Prerequisite: consent of the instructor.

TDC 696 Master's Project. Four credit hours. Students may register for this course only after their advisor has approved a written proposal for their project. Prerequisite: consent of advisor. Independent study form required.

TDC 698 Master's Thesis. Two credit hours. Students may register for this course only after their advisor has approved a written proposal for their thesis. Students must continue to register for this course every quarter after their first registration in it until they complete their project or thesis to the satisfaction of their advisor. They earn two hours of credit for each such registration but only four hours of credit will apply for degree credit. Prerequisite: consent of advisor. Independent study form required.

INSTITUTE FOR PROFESSIONAL DEVELOPMENT OFFERINGS

Application and registration information for the following programs may be obtained by calling the Institute office at 312-362-6282. Students should consult with their advisor prior to registering for an IPD program to determine how it may apply to their degree program.

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.
COURSE DESCRIPTIONS

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 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 ten-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.

COURSES FROM OTHER DEPARTMENTS

ART 405 Advanced Color Design.

ART 461 Graphic Design II. Further explores ideas, processes, tools, and materials involved in the field. Real client contact is established to develop projects including business cards, letterhead, envelopes, brochures, ads, mailers, and posters. Prerequisite: ART 260.

ART 462 Publication Design. Focuses on introduction to design on various methods and visual approaches used to create attractive and easy to read publications; combination of concepts, aesthetics, and presentation techniques to create layouts for magazines, catalogs, and annual reports. Prerequisite: ART 461.

MAT 458 Statistical Quality Control. Consult the Department of Mathematics section of the Graduate Programs Bulletin for the description of this course.

PSY 402 Perceptual Processes. Analysis of the variable involved in the determination of perception with particular attention to the problems of space, motion, distance, size, form, the aftereffects and the constancies. Prerequisite: consent of instructor.

PSY 404 Learning and Cognitive Processes. Survey of classical and instrumental conditioning, biological constraints, attention, memory and practical applications. Major theoretical approaches include stimulus-response, early cognitive theories and information processing theory. Prerequisite: consent of instructor.

PSY 440 Psychology of Work and Motivation. Current research and theories in organizational psychology relating to motivation, job satisfaction, work attitudes, employee withdrawal, and counterproductivity. Prerequisite: consent of instructor.

PSY 441 Psychology of Leadership. Current research and theories in organizational psychology relating to leadership, supervision, job performance, and managerial training. Emphasis is on theoretical development and empirical evaluation of constructs in contemporary research. Prerequisite: consent of instructor.

PSY 443 Psychology of Human Performance (crosslisted with PSY 383). Application of experimental psychology and individual differences to the design of man-machine systems, work environments, and living environments. Prerequisite: PSY 680 or consent of instructor.
PSY 446 Psychological Theories of Organizations. Theory and research in the psychology of organizational design, analysis, systems, processes and change. Prerequisite: consent of instructor.

PSY 447 Organizational Consultation. Applies behavioral science and managerial theories and methodologies to organizational consultation and change processes. Prerequisite: consent of instructor.

PSY 680 Industrial and Organizational Psychology. Application of theories and methods of psychology to the study of human behavior in business, industry and other organizations. Prerequisites: PSY 105 or 106.

Courses Related to the MIS Degree

GSB 499 Effective Communication. The introductory course for the Kellstadt Graduate School of Business draws on factors that make DePaul University distinctive: its Vincentian values, pragmatism and strong relationship with the Chicago business community. The course gives students the opportunity to develop knowledge and skills in communication necessary to effectively influence business and social decision-making. Students are encouraged to examine their personal role in the corporate environment through self-management, and forming and maintaining business relationships. The course examines the dynamics of communication in interpersonal transactions and in decision-making for business and society while exposing the student to specific skills necessary for success in DePaul’s graduate programs and today’s challenging global business environment. Prerequisite: graduate standing.

BLW 500 Legal and Ethical Environment. This is an introduction to the nature and sources of law, including an analysis of ethical perspectives present in the judicial process. Students will learn how legal and ethical issues influence the decision-making process of managers. Students will examine utilitarianism, the rights and justice perspective, and professional obligations as they are represented in the law. Students will explore the relationship between personal values and business decisions, and whether there exists a social responsibility of managers. This course will cover legal concepts relevant to business including basic concepts of public law (constitutional and administrative law) and private laws (sales and product liability). Students will examine business organizations and issues in employment law. Prerequisite: graduate standing.

ECO 500 Money and Banking. This course examines the role of money in the economy from both a functional and macroeconomic perspective. The role of the Federal Reserve as a monetary policy-maker will be examined in detail. Students completing this course will be able to make informed judgments of the impact of monetary and fiscal policy on inflation, interest and exchange rates, and the general level of economic activity. Prerequisite: mathematics workshop, or equivalent.

ECO 509 Business Conditions Analysis. This course teaches students how to use available economic data to assess business conditions. This is done by: (1) evaluating the sources and usefulness of data periodically released by government and private sources and (2) developing a macro-economic framework that the student can use to analyze business conditions. Completion of this course will allow students to understand economic news and relate it to their business or job. Prerequisites: mathematics and statistics workshops, or equivalent.
FIN 500  **Financial Institutions and Markets.** This course covers the structure and functions of the most important financial institutions and financial markets. Coverage includes the banking system, saving institutions, other financial institutions, money markets, capital markets, and markets for derivative securities. **Prerequisite: mathematics workshop, or equivalent.**

IB 500  **Global Economy.** This course is designed to be an introduction to the economic environment in which businesses operate. With the increasing interdependence of national economies and the growing role of global enterprises, the understanding of international economic issues is vital to decision-makers. The material covered will include both socio-cultural aspects and economic and financial dimensions of global business. Students should obtain a grasp of the basic theory as well as a knowledge of the major current issues in the global economy. **Prerequisite: graduate standing.**

Accounting

500  **Financial Accounting.** This introduction to financial accounting provides both a theoretical foundation and an opportunity to apply accounting logic in increasingly complex situations. The accounting model and information processing cycle are developed. The content of the income statement, balance sheet, and statement of cash flows are studied in detail and analyzed. **Prerequisite: graduate standing.**

526  **Microcomputer Uses in Decision-Making.** Hands-on use of microcomputers as tools for solving business problems. Students will learn to apply existing software and to construct their own worksheets. Emphasis will be on problem formulation, input preparation and solution analysis. Problems are selected from areas such as allocation of scarce resources, capital budgeting, inventory planning and control, pricing and performance evaluation. Offered Autumn, Spring. **Prerequisites: basic knowledge of Lotus 1-2-3, GSB 502 and either Accounting 542 or GSB 511 and permission of instructor.**

527  **Design and Construction of Decision Models.** This course covers the art of decision model construction and the application of existing decision models to managerial planning, control and decision-making. Existing models covered include linear programming and sensitivity analysis, learning curves, correlation analysis, inventory control models, PERT, and CPM. Students will learn to apply probability and utility theory to decision-making under uncertainty, as well as to apply the concepts of game theory to conflict situations in a business setting. If time permits, the application of Markov processes and simulation to managerial planning and decision situations will be covered. Extensive microcomputer applications will be used in this course. Offered variably. **Prerequisite: Completion of Phase 1 or equivalent.**
535 **Accounting Systems.** Today's business person requires a fundamental knowledge of computer-based information systems and their role in accounting functions and financial decision-making. This course will enable the student to interface with accounting systems, to participate in their design and audit, and to use microcomputers effectively in financial planning, control and analysis. Topics include: advanced data processing concepts; computer security and controls; systems analysis, design and implementation; hardware/software evaluation and selection; database systems; data communications; and office automation. Students will gain substantial hands-on experience on microcomputers using Lotus 1-2-3 and Lotus Symphony.

588 **Management Consulting in the Accounting Profession.** This course provides an overview of the scope and practice of management consulting and management advisory services (MAS) in the accounting profession. The process of management consulting is examined including: problem identification, proposal development, fact-finding, solution analysis and implementation of recommendations. Case studies will be used in the course to demonstrate the process of management consulting in various areas. The course reviews the professional standards and ethics of management consulting practice. In addition, the course includes the marketing and engagement management aspects of management consulting. Offered: variably. **Prerequisite: completion of Phase I or equivalent.**

Management Information Systems

674 **Systems Analysis and Design: Concepts, Tools and Techniques.** This course is designed as the first of two courses. It focuses on the early phases of the information systems development life cycle and covers primarily process-oriented techniques, methods and methodologies. This course prepares students for the case study-oriented MIS 676 course where learned techniques are applied. Laboratory exercises include the use of a computer-aided software engineering (CASE) tool. Offered Autumn, Winter, Summer. **Prerequisites: completion of Phase I and MIS 670 or equivalent.**

675 **Advanced Systems Techniques.** This course assumes a familiarity with basic systems techniques and tools such as data gathering, recording and analysis, flow charting, decision tables, system implementation, etc. Topics to be covered include systems concepts and philosophy, project management, advanced tools of systems analysis and design, the human element in systems, and the like. **Prerequisite: MIS 676 or equivalent or permission.**

676 **Management Information Systems: Planning, Design and Implementation.** The second of a two-course sequence for MIS majors. It summarizes and extends the concepts of functionally oriented, structured, and data-oriented methodologies and CASE tools and focuses on applying them. It covers other topics of interest to the systems developers and systems manager, such as: methodologies for systems development without programmers (prototyping, 4th generation languages, end user computing), management of information services including information center concepts, and analysis and design of decision support and expert systems. Offered Winter, Spring. **Prerequisites: MIS 671 and MIS 674 or equivalent.**
677 Information Systems Project Management. Projects are often late, over-budget, technically inoperable, operationally infeasible, and in some cases never finished. One of the roots of this problem has been the lack of experienced management. What is needed are appropriate managerial procedures of planning, scheduling and control that are responsive to the needs of the environment. This course will define the essential components of good project management. Although the emphasis will be on management of systems and data processing projects, the concepts and techniques presented will be general enough to be of value of those involved with the design and implementation of any project. Offered Winter, Summer. Prerequisite: MIS 674 or equivalent or permission.

678 Problems in Systems Design. Problems in systems design, analysis, implementation and management are presented, discussed and analyzed. The emphasis in this course is on developing an analytical ability for dealing with systems problems and a professional capability in planning and managing systems. Offered Spring. Prerequisite: MIS 676 or equivalent or permission.

679 Graduate Seminar in Information Systems. Formal aspects of the course will provide a framework for integrating the various areas and disciplines studied in other courses. Readings, classroom discussion and group participation will be required of all students. Offered Winter and Spring. Prerequisite: MIS 674 or permission.

683 Information Processing Management (cross-listed as CSC 483). The organization of the Information Systems Department. Staffing, documentation and performance standards. The budget process. Design and layout of data processing facilities. Hardware/software specifications and selection. Offered variably. Prerequisite: MIS 676 or equivalent.

684 Computers in Society. The computer has had a profound effect on individuals, organizations and society as a whole. Its effects have been both positive and negative. Computer-based systems are currently implemented in virtually every field of endeavor and in the future will, in all likelihood, have an even greater impact than they have now. Developments within this field have occurred very rapidly over a relatively short period of time, so that we must now consider the implications of this revolution on the individual, on organizations, and on society as a whole. This course will examine the historical perspective, the computer industry, implications for the individual, effects on organizational practice, privacy and the quality of life, professionalism and ethics, and future trends. Offered variably. Prerequisite: MIS 670 or equivalent.
COURSE DESCRIPTIONS

685 Security, Accuracy and Privacy in Computer Systems. Management decisions are increasingly being made on the basis of information provided to managers by the data processing system rather than on the basis of experience and intuition alone. In order for this information to be reliable, it must be accurate and its integrity must be maintained. Data and records are vital assets to an enterprise and therefore must be guarded against unauthorized access and manipulation just as other, more tangible, assets are guarded. Just as data and records are important to an enterprise and therefore must be accurate and secure, so are an individual's data and records important to him/her. Therefore, the issues of privacy—who is authorized to examine an individual's records—and accuracy—the completeness and correctness of the records—are critical. The three subjects are related in their technical solutions and hence should be considered together in the planning of computer installations. Offered variably. Prerequisite: MIS 676 or equivalent.

689 Decision Support Systems and Expert Systems. A seminar on the planning, design and implementation of decision support systems (DSS) and expert systems (ES). The emphasis of the course is on developing and building decision support systems. Consideration will also be given to end user computing and the evaluation and selection of DSS generators and ES skills. Students will gain hands-on experience in using DSS generators such as IFPS, prototyping languages such as FOCUS, and expert system skills. The course will include readings, a research paper and presentations. Offered Spring. Prerequisite: MIS 676 or equivalent or permission.

798 Special Topics. Content and format of this course are variable. An in-depth study of current issues in management information systems. Subject matter will be indicated in class schedule. Offered variably. Prerequisite: as indicated in class schedule.

Management

500 Managing People I. Students will critically examine and creatively solve problems of managing individuals and teams within organizations. Fundamental principles of perception, attribution, motivation and learning will be applied as participants engage in the study of leadership, empowerment, team development, managing innovation and change, decision processes, business ethics, and power and politics. Prerequisite: graduate standing.

502 Operations Management. This course provides an introduction and overview of the field of operations management. Students will learn how the operations function of a firm is responsible for the creation and distribution of goods and services. Major problems and ethical issues concerning the management of domestic and international operations are addressed. Quantitative and qualitative concepts of quality and continuous improvement are applied to both the manufacturing and service sectors. Prerequisites: mathematics and statistics workshops, or equivalent.

510 Quality Control. This course offers a treatment of several specific production and operations management functional areas including: statistical process control, total quality control, just in time, enhanced scheduling technologies, and productivity measurement. The interrelationship of these topics is identified and applications are discussed in various manufacturing and service environments. Offered Autumn, Spring. Prerequisite: completion of Phase I or equivalent.
580  **Operations Research.** This course focuses on a scientific approach to problem solving and model building. Topics covered include mathematical programming, integer programming, Markov processes, game theory and simulation. Emphasis is placed on application models, computer implementation and solutions. **Prerequisite:** MGT 501.

590  **Management of Innovation and Technological Change.** This course provides a foundation for managing technology in a competitive environment with global implications. Managing technology, whether in R&D or the finance department, requires the manager to understand, utilize and support technology. Technology is discussed as a critical component, along with people and skills, in adding value to products and services. Other topics discussed include entrepreneurship, a technology foundation, deployment of technology, and the industry evolution process. Selected emerging technologies and their future evolutions are studied. Offered Winter. **Prerequisite:** completion of the internal and external environment courses or equivalent.

**Marketing**

585  **Marketing Information Systems for Decision Support.** Course explores the development of a systems approach to the collection, analysis and distribution of marketing information within the organization. Topics include expert systems, data-base development and maintenance, and planning and control systems for marketing decision-making. Offered variably. **Prerequisite:** MIS 500, ACC 555, MKT 555, and MKT 525 or equivalent.
THE UNIVERSITY
CAMPUSES
LIBRARIES
ACADEMIC COMPUTING FACILITIES
CAREER DEVELOPMENT CENTER
RESIDENCE LIFE

ACCREDITATION
HONOR SOCIETIES
BOARD OF TRUSTEES
GENERAL ADMINISTRATION
ADMISSION AND REGULATIONS
TUITION AND FEES
FINANCIAL AID
ACADEMIC CALENDAR
STATEMENT OF VINCENTIAN CHARACTER
THE UNIVERSITY

CAMPUSES

DePaul University has five locations. The Lincoln Park Campus is situated about three miles north of the Chicago Loop in the vicinity of Webster (2200 N), Halsted (800 W) and Racine (1200 W). The College of Liberal Arts and Sciences, The School of Music, The School of Education and The Theatre School are located on the 30-acre campus.

The Loop Campus, between State Street and Wabash Avenue at Jackson Boulevard, houses the general administration of the University, the College of Law, the College of Commerce and the School for New Learning.

The Naperville Campus is located at 150 West Warrenville Road, Naperville, Illinois (at I-88 and Naperville Road). The O'Hare Campus is located near O'Hare Airport at 3166 River Road, DesPlaines—just north of the intersection of River Road and Devon. The South Campus is located at South Suburban Community College's University and College Center, 16333 South Kilbourn Avenue, Oak Forest—at 1-57 and 167th Street. The College of Commerce, the School of Computer Science, Telecommunications and Information Systems, the College of Liberal Arts and Sciences and the School for New Learning offer courses at a number of these sites.

UNIVERSITY LIBRARIES

The University Libraries provide resources and services to students, faculty, and staff through six different units: The Lincoln Park Library, the Naperville Campus Library, the O'Hare Campus Library, and the South Campus Library. The delivery of information and materials is increasingly linked to computer and networking technologies. Electronic access to periodical articles, indexes, and other information resources in the social sciences, business, law, humanities, and sciences is readily available in all libraries.

Access to materials in all the DePaul Libraries is provided through ILLINET Online, the Libraries’ online catalog and circulation systems. The combined collection of the DePaul University Libraries includes over 700,000 volumes, 300,000 microform volumes, 9,000 current serial subscriptions, and a diverse microcomputer software and audiovisual collection.

ILLINET Online also allows users to identify books from over 45 other colleges and universities in Illinois, including the University of Illinois. Current DePaul students may choose to borrow directly from these institutions in person or request an Interlibrary loan. Holdings information for an additional 800 public, private, and academic libraries in Illinois can also be displayed. Materials from these and other libraries across the United States can be located and obtained through interlibrary loan.

Information, brochures, and bibliographies are available at all six locations and through the library link from DePaul's World Wide Web site: http://www.depaul.edu.

The John T. Richardson Library at Lincoln Park supports programs in the College of Liberal Arts and Sciences, the School of Education, the School of Music, and the Theatre School. Collection areas of particular strength are religion, philosophy, and Irish studies. Facilities include a media area for using audiovisual materials and the Education Resource Center with curriculum materials for elementary and secondary school teaching, a slide library, a Career Information Center, and a collection of music recordings and scores. Rare book collections include the Napoleon Collection, the Dickens Collection, and the Sporting Collection, as well as numerous titles dealing with nineteenth century literature and book illustration. The University Archives houses materials documenting the growth and development of DePaul.

The Loop Campus Library primarily focuses on materials to support the programs of the College of Commerce and the School of Computer Science, Telecommunications and Information Systems, but also has a core collection of reference materials in other areas. Areas of strength in the collections are accounting and finance. A Career Information Center provides resources on career choice, job search techniques, and company information. A collection of
corporate annual reports from Fortune 500 companies is maintained.

The College of Law Library has an extensive collection of Anglo-American legal materials which provides both basic and advanced resources needed to support the law school curriculum. The law collection includes United States federal and state court reports, codes, constitutions, and statutes; materials on health law, tax law and international human rights law; and legal periodicals. Designated an official depository for government publications, the Law Library provides a selective collection of federal documents.

The Naperville, O'Hare and South Campus Libraries offer an innovative approach to library service by providing access to information using computers and telecommunications. The Library's networked electronic information resources include access to ILLINET Online, and also provide access to periodical articles, business reports, indexes, an encyclopedia and other reference sources. The O'Hare and South Campus libraries have small, select print reference collections; the Naperville Campus Library has a more significant collection of print materials including journals and books. Books and other journal articles needed by students and faculty are delivered by a daily intra-university shuttle service.
ACADEMIC COMPUTING FACILITIES

Information Services (IS) provides facilities and resources to support instruction and research at DePaul University. DePaul's campus-wide network connects the Microcenters, computer classrooms and faculty offices on its six campuses to computing resources. These resources consist of three Sun SparcServers (Unix) and approximately 20 Novell Netware servers. The Microcenters offer Windows and Macintosh workstations, high-speed line printing and laser printing. They also offer access to the Internet through a variety of client applications. The computer classrooms have a computer for each student, and accommodate classes of 27 to 36 students. There are approximately 600 workstations in the Microcenters and computer classrooms throughout DePaul. Dial-in access is also available, including v.34 SLIP-based modem pools for students with DePaul Online accounts.

<table>
<thead>
<tr>
<th>LOOP CAMPUS</th>
<th>LINCOLN PARK CAMPUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science &amp; Telecommunications Center 400</td>
<td>Schmitt Academic Center 235</td>
</tr>
<tr>
<td>243 South Wabash</td>
<td>2320 North Kenmore</td>
</tr>
<tr>
<td>(312) 362-8336</td>
<td>(773) 325-7000, x1097</td>
</tr>
<tr>
<td>60 Windows Workstations</td>
<td>115 Windows Workstations</td>
</tr>
<tr>
<td>Lewis Center 1420</td>
<td>23 Macintosh Workstations</td>
</tr>
<tr>
<td>25 East Jackson Boulevard</td>
<td>Byrne Hall 358</td>
</tr>
<tr>
<td>(312) 362-8593</td>
<td>2219 North Kenmore</td>
</tr>
<tr>
<td>50 Windows Workstations</td>
<td>(773) 325-7000, x1088</td>
</tr>
<tr>
<td>12 Macintosh Workstations</td>
<td>20 Windows Workstations</td>
</tr>
<tr>
<td>Computer Classrooms</td>
<td>McGaw Hall 145</td>
</tr>
<tr>
<td>Lewis Center 13th Floor</td>
<td>802 West Belden</td>
</tr>
<tr>
<td>25 East Jackson Boulevard</td>
<td>(773) 325-7000, x1096</td>
</tr>
<tr>
<td>(312) 362-8177</td>
<td>25 Windows Workstations</td>
</tr>
<tr>
<td>3 Classrooms</td>
<td>O'HARE CAMPUS</td>
</tr>
<tr>
<td>100 Windows Workstations</td>
<td>3166 River Road, Room 207</td>
</tr>
<tr>
<td></td>
<td>Des Plaines, IL</td>
</tr>
<tr>
<td></td>
<td>(312) 362-7608</td>
</tr>
<tr>
<td>SOUTH CAMPUS</td>
<td>50 Windows Workstations</td>
</tr>
<tr>
<td>1633 South Kilbourn Road, Room 5004</td>
<td>NAPERVILLE CAMPUS</td>
</tr>
<tr>
<td>Oak Forest, IL</td>
<td>150 W. Warrenville Road</td>
</tr>
<tr>
<td>(708) 633-9093</td>
<td>Naperville, IL</td>
</tr>
<tr>
<td>14 Windows Workstations</td>
<td>(312) 362-6481</td>
</tr>
<tr>
<td>Lewis Center 1504</td>
<td>20 Windows Workstations</td>
</tr>
<tr>
<td>25 East Jackson Boulevard</td>
<td>Schmidt Academic Center 230</td>
</tr>
<tr>
<td>(312) 362-8765</td>
<td>2320 North Kenmore Avenue</td>
</tr>
<tr>
<td></td>
<td>(312) 362-8765</td>
</tr>
</tbody>
</table>

CUSTOMER TECHNOLOGY SERVICES

Students, faculty and staff have access to a variety of applications in the Microcenters, and these are used extensively throughout the DePaul curriculum. IS also offers seminars and workshops on various topics. Brochures listing the workshops and hours of operation are available at all of the above sites.

STUDENT AND CAREER DEVELOPMENT

The University has two office locations offering career planning and placement services to graduate students and alumni, providing resources for those exploring career options as well as for those actively involved in a targeted job search. Appointments are available at either the Loop Campus, 9th floor, DePaul Center, or at the Lincoln Park Campus, first floor of the Schmitt Academic Center.
DePaul's Student and Career Development professionals are committed to helping students and alumni develop skills in identifying career opportunities, and seeking out and securing satisfying employment. The tools utilized by the staff include career and job search seminars, mock interviews, career libraries on both campuses, vocational interest inventories, and individual counseling.

Both full- and part-time job leads are available through the Center. Leads for immediate openings are continually listed and updated, and an active on-campus interview program gives students and alumni access to career opportunities.

The Center has recently developed an innovative program for the registration of full-time job seekers. A computerized database allows candidate information to be matched to an employer's job specifications. Rapid turnaround time has dramatically improved the consideration given candidates referred from DePaul.

RESIDENCE LIFE

The University does not currently have housing for graduate students. The Residence Life Office, however, provides an off-campus housing listing service for DePaul faculty, staff and students. This service lists available apartments in the Lincoln Park area. The Residence Life Office is located at 2332 N. Clifton Ave. (773/325-7196). Office hours are Monday through Friday, 9:00 a.m. to 5:00 p.m.

ACCREDITATION

DEPAUL UNIVERSITY IS ACCREDITED BY

AACSB — The International Association for Management Education
The American Chemical Society
The American Psychological Association
The Association of American Law Schools
The Commission of Institutions of Higher Education of
The North Central Association of Colleges and Schools
The National Association of Schools of Music
The National Council for Accreditation of Teacher Education
The National League of Nursing

DEPAUL IS ON THE APPROVED LIST OF

The American Bar Association
The Illinois Board of Higher Education
The Illinois Department of Registration and Education
The Illinois Office of Education, State Teacher Certification Board
The State Approving Agency for Veterans Training

DEPAUL UNIVERSITY IS A MEMBER OF

The American Association of Colleges of Nursing
The American Association of Colleges for Teacher Education
The American Association of Higher Education
The American Association of Theatre for Youth
The American Association of University Women
The American Council on Education
The Association of American Colleges and Universities
The Association of Catholic Colleges and Universities
THE ASSOCIATION OF GOVERNING BOARDS OF UNIVERSITIES AND COLLEGES
THE CHICAGOLAND ADVOCATES FOR SIGNED THEATRE
THE CONSORTIUM OF CONSERVATORY PROGRAMS
THE COUNCIL FOR ADULT AND EXPERIENTIAL LEARNING
THE COUNCIL OF GRADUATE SCHOOLS
THE FEDERATION OF INDEPENDENT ILLINOIS COLLEGES AND UNIVERSITIES
THE ILLINOIS ARTS ALLIANCE
THE ILLINOIS LEAGUE FOR NURSING
THE INTERNATIONAL ASSOCIATION OF THEATRE FOR CHILDREN AND YOUNG PEOPLE
THE LEAGUE OF CHICAGO THEATRES
THE MIDWEST ALLIANCE IN NURSING
THE NATIONAL ASSOCIATION OF INDEPENDENT COLLEGES AND UNIVERSITIES
THE NATIONAL CATHOLIC EDUCATION ASSOCIATION
THE NATIONAL COUNCIL OF EDUCATIONAL OPPORTUNITY ASSOCIATIONS
THE NATIONAL COUNCIL ON REHABILITATION EDUCATION

### HONOR SOCIETIES

<table>
<thead>
<tr>
<th>Honor Society</th>
<th>Honor Society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Lambda Delta</td>
<td>Phi Delta Kappa</td>
</tr>
<tr>
<td>Beta Alpha Psi</td>
<td>Phi Kappa Delta</td>
</tr>
<tr>
<td>Beta Gamma Sigma</td>
<td>Phi Kappa Phi</td>
</tr>
<tr>
<td>Delta Mu Delta</td>
<td>Pi Kappa Lambda</td>
</tr>
<tr>
<td>Delta Sigma Pi</td>
<td>Pi Sigma Alpha</td>
</tr>
<tr>
<td>Golden Key National Honor Society</td>
<td>Psi Chi</td>
</tr>
<tr>
<td>Omicron Delta Epsilon</td>
<td>Sigma Delta Pi</td>
</tr>
<tr>
<td>Order of the Coif</td>
<td>Sigma Pi Sigma</td>
</tr>
<tr>
<td>Phi Alpha Delta</td>
<td>Sigma Theta Tau</td>
</tr>
<tr>
<td>Phi Alpha Theta</td>
<td>Sigma Xi</td>
</tr>
<tr>
<td>Phi Beta Delta</td>
<td>Theta Alpha Kappa</td>
</tr>
</tbody>
</table>
1996-1997 BOARD OF TRUSTEES

OFFICERS
Jack M. Greenberg
Chair
Edward A. Brennan
Vice Chair
John B. Simon
Vice Chair
Elaine M. Watson
Secretary

MEMBERS
William J. Bauer
William E. Bennett
Norman R. Bobins
Victor J. Cacciatore
Carlos H. Cantu
Denis H. Carroll
Robert A. Clifford
James W. Compton
James B. Cormack, C.M.
Jacob Dickens
Samuel A. DiPiazza
Richard H. Driehaus
Jean-Pierre Ergas
David W. Fox
Edward G. Gardner
Sue L. Gin
Jerome D. Girsch
Robert E. Goldberg
Paul L. Golden, C.M.
Howard S. Goss
Richard A. Hanson
William E. Hartenbach, C.M.
Sondra A. Healy
Richard A. Heise
Robert W. Kustra
Anne C. Leonard, C.N.D.
Sheila Lyle, R.S.M.
Alan G. McNally
Thomas F. Meagher
Henry C. Mendoza
John P. Minogue, C.M.
Peter Pesce
Roger L. Plummer
Prudencio Rodriguez De Yurre, C.M.
Lawrence C. Russell
Samuel K. Skinner
William B. Snow
John C. Staley
Harrison I. Steans
Richard E. Terry
John G. Weithers
Joseph E. Wilson
Ernest R. Wish
John A. Zenko

GENERAL ADMINISTRATION
John P. Minogue, C.M.
President
John T. Richardson, C.M.
Chancellor
Richard J. Meister
Executive Vice President for Academic Affairs
Kenneth A. McHugh
Executive Vice President/Vice President for Business/Finance
Elaine M. Watson
Secretary of the University, Vice President for Administration
Maryam Ahmad
Special Assistant to the President on Diversity
James R. Doyle
Vice President for Student Affairs
Helmut P. Epp
Vice President for Information Services
David O. Justice
Vice President for Lifelong Learning and Suburban Campuses
David H. Kalsbeek
Vice President for Enrollment Management
Robert L. Kozoman
Treasurer of the University
James K. Looney
Vice President for Institutional Advancement
Carole S. Schor
Vice President for Human Resources
Edward R. Udovic, C.M.
Senior Executive for University Mission
Susan H. Wallace
Controller of the University
ADMISSION CLASSIFICATIONS

Applicants are admitted to the School of Computer Science, Telecommunications and Information Systems on the basis of their ability to complete programs of study and research prescribed for the master's and doctoral degrees. Specifically, admission qualifications are measured by academic criteria.

In accord with these criteria, applicants are admitted in one of three major categories: degree-seeking, non-degree-seeking, and student-at-large.

DEGREE-SEEKING STUDENTS

Applicants are admitted as degree-seeking students in either of two ways: full or conditional.

FULL DEGREE-SEEKING STATUS

The minimum requirements for this status are:

- Bachelor's degree conferred by a regionally accredited institution.
- Scholastic achievement in undergraduate studies satisfying all requirements for entering a specific graduate program.
- Unconditional approval by the program director of the applicant's proposed course of graduate study.
- Submission to the School office of all required supporting credentials.

Please note these are minimum requirements for full admission. The program section of this Bulletin provide additional, more specific and selective, criteria for admission to specific programs.

CONDITIONAL DEGREE-SEEKING STATUS

The minimum requirements for this status are:

- Bachelor's degree conferred by a regionally accredited institution.
- Scholastic achievement in undergraduate studies indicating a capacity to pursue successfully a specific program of graduate study.
- Conditional approval by the program director of the applicant's proposed course of graduate study.
- Submission to the School office of all required supporting credentials.

A conditionally admitted applicant is eligible for reclassification to full, degree-seeking status when the conditions of admission have been satisfied.

NON-DEGREE-SEEKING STUDENTS

At the Dean's discretion, applicants who do not wish to pursue an advanced degree may be admitted. Non-degree-seeking students may, at some future date, make application for reclassification to degree-seeking status.

NON-DEGREE-SEEKING STATUS

The minimum requirements for this status are:

- Bachelor's degree conferred by a regionally accredited institution.
- Scholastic achievement in undergraduate studies indicating a capacity to pursue successfully graduate course work.
- Approval by the dean.
- Submission to the School office of all required supporting credentials, including a letter of intent addressed to the dean.
When such students file for reclassification, the program director may recommend, in writing, to the dean that a maximum of three courses (12 quarter hours) completed by the student under the non-degree-seeking status be counted toward fulfillment of the advanced degree requirements.

STUDENT-AT-LARGE

The School of Computer Science, Telecommunications and Information Systems may admit as a student-at-large a graduate student currently enrolled in a graduate program in another accredited institution upon the recommendation, in writing, of the student's own graduate dean.

A student-at-large must submit the application for admission to the School office. The only supporting credential required is a letter from the dean of the graduate school where the student is in good standing. This letter should state in general terms the course or courses the student is authorized to take.

Under no circumstances does this classification constitute admission to a degree program at DePaul University.

DEPAUL SENIORS

Seniors in any of the undergraduate colleges or schools of DePaul University are eligible to apply for admission to the School of Computer Science, Telecommunications and Information Systems while completing their undergraduate program.

ADMISSION PROCEDURES

GENERAL PROCEDURES

Procedures for admission to the School of Computer Science, Telecommunications and Information Systems involve a completed application form, supporting credentials, admission fee, deadlines and the dean's admission letter.

Application Form: You can obtain a graduate application form either by mailing your request to the School of Computer Science, Telecommunications and Information Systems Graduate Office, DePaul University, 243 South Wabash, Chicago, Illinois, 60604 or by calling (312) 362-8381. Please include your proposed program of study in your request because the composition of the application packet varies according to the degree.

Note: An undergraduate DePaul senior is eligible to submit an application to the graduate program before completing the undergraduate program.

Supporting Credentials: Official transcripts of your academic records at all universities, colleges and junior colleges attended are required. Please direct the registrar(s) to mail these official transcripts directly to the School of Computer Science, Telecommunications and Information Systems Office, DePaul University. Since there is frequently a delay in the forwarding of transcripts, you are advised to make your request as early as possible.

Note: Several programs require additional supporting credentials. Please consult the specific programs listed in this Bulletin to determine what additional materials are required for admission to the specific course of graduate study.

An undergraduate DePaul senior, making application, should request the registrar to forward an official transcript to the School office. A written recommendation for admission from the student's current chairperson or program director should also be provided.

Admission Fee: A check or money order payable to DePaul University in the amount of $25.00 must accompany the completed application form. Any application form received without the fee will be returned unprocessed. The fee is nonrefundable.

Dean's Admission Letter: The dean will notify you by letter of your admission status. It is the policy not to review, evaluate or act upon any application for admission without having the completed application form, all the supporting credentials, and the application fee.
If you do not enroll at the University within one year of the date of your letter of admission, you must complete an application for readmission.

GRADUATE CREDIT TRANSFER
Credit transfer in degree programs leading to the master's or doctoral degree ordinarily is not allowed. However, the dean may authorize an exception to this policy when, in the judgment of the dean and the program director, the circumstances justify the exception.

INTERNATIONAL STUDENT ADMISSION
Applicants educated outside of the United States must obtain the application for international admission by writing to the Graduate Admission Office. Candidates must meet academic requirements and demonstrate English proficiency with a TOEFL score of 550 or greater (580 or greater for Ph.D. applicants). Those requesting student visas (I-20) must demonstrate adequate financial support. The letter of admission and the visa form I-20 are issued only after admission.

International applicants are strongly urged to make application as early as possible. Usually there are long delays in the forwarding of all supporting credentials.

READMISSION PROCEDURES
If you were previously enrolled in a graduate program in the School of Computer Science, Telecommunications and Information Systems but have not been in attendance for a period of one calendar year or longer, but not more than four calendar years, you must file a readmission form with the School office. (If more than four years have elapsed since you have been in attendance, you must file a new application.) The form must be submitted at least two weeks prior to the day of registration for the term in which you expect to resume your studies. There is a $5.00 service fee for processing a readmission form.

An official copy of transcripts recording scholastic work completed since the last enrollment at DePaul University must be submitted. As a general rule, students are held to the degree requirements that are in force at the time of readmission.

RECLASSIFICATION PROCEDURES
Should you desire a change in your major or admission status, you must file a reclassification application with the School office.

MASTER'S PROGRAM REQUIREMENTS
For the master's degree, all programs involve the following: 1) credit hours, 2) thesis, or comprehensive examination, and 3) program time limitation.

Credit Hours. For the master's degree, most programs for graduate students require fifty-two quarter hours of course work.

Specific degree requirements are listed in the program sections of this Bulletin.

Thesis. The University offers the master's degree both with and without the thesis; however, the thesis is required by some areas. The thesis is limited to the student's field of specialization and should offer satisfactory evidence of the candidate's potential for scholarly research.

The student is advised to consult the School office for information regarding the required form and type of paper to be used for the thesis. Responsibility for fulfilling these requirements lies with the student, not the typist.

The student, after completing the thesis, will submit it to the director of his or her thesis committee for consideration, or the student will not be permitted to graduate until a subsequent convocation. When the thesis is accepted, the student must file the designated number of typewritten copies in the School office. The binding fee is $10.00 per copy, to be submitted along with the copies of the thesis. The date for filing is published in the current Bulletin and the class schedule or may be obtained directly from the School office. The respon-
sibility for meeting this deadline lies with the student.

**Comprehensive Examination.** The type and the subject matter of the examination follow the regulations established in the various programs. If the student does not pass the examination, the school or program may grant permission for another examination. The examination may not be taken more than twice.

**Program Time Limitation.** Graduate students in master's programs are expected to complete their program degree requirements within a six-year period from the first registration date for a course in the program. When a graduate student fails to finish before the end of the sixth year, the program director may recommend, on receipt of the student's petition, in writing, to the dean, an extension of time with or without additional courses, examinations or other conditions.

**DOCTORAL PROGRAM REQUIREMENTS**

The Doctor of Philosophy, the highest academic degree that DePaul University confers, is offered by the School of Computer Science, Telecommunications and Information Systems. The degree shows that the recipient has demonstrated proficiency in a broad area of learning, as well as the potential to explore and advance that field of knowledge by independent research.

Following are the minimum general requirements for all candidates for the Doctor of Philosophy degree in the areas of 1) credit hours, 2) academic achievement, 3) residence, 4) admission to candidacy, 5) dissertation, 6) final examination and 7) program time limitations. Additional requirements are stated in the program section of this Bulletin.

**Credit Hours.** For the doctoral degree the graduate student will complete no less than 60 quarter hours of credit beyond the master's degree.

**Academic Achievement.** A student will be advised to withdraw from the doctoral program when the School judges that the student is not maintaining satisfactory progress toward the degree. Students are required to maintain at least a 3.5 average. A course grade below C is unsatisfactory and will not be counted toward completing degree requirements. The determination of satisfactory progress is not limited to grades and grade point average, but includes all factors in the student's performance.

**Residence.** At least three quarters beyond the master's level must be spent in full-time study at DePaul University. Full-time study is defined as registration for a minimum of eight quarter hours in a quarter. With prior approval of the school, the student may satisfy residency by course work, by participation in seminars, or by research performed off campus.

To reflect the diversity of graduate study for the Ph.D. degree at stages other than the residency stage, doctoral candidates are full-time students who are registered for Reading and Research (four quarter hours); for Thesis Research (four quarter hours); or for Candidacy Continuation (zero hours credit).

**Admission to Candidacy.** Admission to candidacy implies that the faculty is satisfied that the doctoral candidate is sufficiently knowledgeable in the student's area of specialization and in the use of research tools to be able to prepare an acceptable dissertation.

For admission to candidacy the doctoral candidate shall complete three quarters of full-time study beyond the master's level. Other requirements include a comprehensive examination and allied field study.

The School office will issue to each doctoral candidate a letter to authenticate admission to candidacy. Admission to candidacy will be entered on the doctoral candidate's scholastic record.

There is a time limit of four years between admission to the School of Computer Science, Telecommunications
and Information Systems and admission to candidacy. Once admitted to candidacy, the doctoral candidate must maintain registration in the University in each of the quarters of the academic year until the degree requirements have been completed. Among other courses, the following are appropriate to maintain registration: Independent Study (four quarter hours); Resident Candidacy Continuation (non-credit); or Non-Resident Candidacy Continuation (non-credit). Failure to comply with the policy governing registration in the University, in each of the quarters of the academic year until the degree requirements have been completed, may result in dismissal from the doctorate program. Candidacy status may be reinstated only after the student has applied for readmission (see Readmission Procedures).

Dissertation. The doctoral candidate will prepare a dissertation based on the student’s research. The purpose of the dissertation is to evidence both one’s scholarship and ability to carry on such independent research as definitely contributes to the advancement of knowledge. The topic of the dissertation should be submitted to the dissertation advisor who will assist the student in forming a dissertation committee to approve the topic and to assist the doctoral candidate through all stages in the preparation of the dissertation. The chairperson of this committee is the dissertation advisor.

All doctoral dissertations are to be microfilmed. After all requirements have been completed, the doctoral candidate submits to the School office the designated number of typewritten, unbound, final copies of the dissertation. (The first copy is to be in satisfactory condition for microfilming.) The candidate also prepares and submits a 350-word abstract of the dissertation. The abstract will be published in Dissertation Abstracts and will include an announcement that the dissertation is available in film form. One microfilm copy will be deposited in the University Library and will be available for interlibrary loan.

To defray the costs of microfilming and publication, a fee of $75.00 is collected when dissertation copies are submitted.

Microfilming is considered by the University to be a form of publication. Publication by microfilm, however, does not preclude the printing of the dissertation in whole or in part in a journal or monograph.

Final Examination. The dissertation is the principal basis of the final examination. After completing the dissertation, and at least eight months after admission to candidacy, candidates should submit a petition for the final examination to the School. After the examination, the chair of the committee sends a report of the results, signed by all committee members, to the School office.

When these steps have been completed, the doctoral candidate becomes eligible for degree conferment at the next convocation.

Program Time Limitations. For graduate students in a doctoral program, the time limits to complete the requirements for the Doctor of Philosophy degree are 1) between admission to the doctoral program and admission to candidacy: not more than four years; and 2) between admission to candidacy and the final examination: not less than eight months, and not more than five years.
ACADEMIC INFORMATION AND REGULATIONS

This bulletin is the official statement of the requirements, rules and regulations for the Graduate Programs offered by the School of Computer Science, Telecommunications and Information Systems. This bulletin does not constitute a contract between the student and the University. Every effort has been made to provide accurate and firm information. The University reserves the right to revise the content of its Bulletins and Schedules, and to change policies, programs, requirements, rules, regulations, procedures, calendars and schedule of tuition and fees; to establish and modify admission and registration criteria; to cancel or change courses or programs and their content and prerequisites; to limit and restrict enrollment; to cancel, divide or change time or location or staffing of classes; or to make any other necessary changes.

A student upon admission to a graduate program is to follow the bulletin requirements in effect at the time of entrance. A student who is readmitted or who changes his or her program or enrollment status is subject to the terms of the bulletin in effect at the time of readmission or status change.

As a graduate student you assume the responsibility to know and meet both the general and particular regulations, procedures, policies, and deadlines set forth in this bulletin. All students are expected to adhere to the Student Code of Responsibility found in the Student Handbook. The University follows the requirements outlined in the Family Educational Rights and Privacy Act of 1974 which outlines the rights of students to review their educational records. The procedures for such review and the rights of students in this regard are set forth in the Student Handbook.

Certain student information, known as "Directory Information," may be disclosed by the institution to outside parties, unless the student has specifically requested that this information not be released. DePaul University considers the following to be Directory Information: name, address, telephone number, college of enrollment, class, major field of study, dates of attendance, degrees and awards received, the most recent educational agency or institution attended by the student, and participation in officially recognized activities and sports. Students who do not want Directory Information released should make a written request to the Office of the Registrar to withhold this information.

ACADEMIC COUNSELING

Academic counseling helps to insure successful completion of graduate studies. If you are a degree-seeking student, contact your faculty advisor. If you are a non-degree seeking student or a student-at-large, contact either your graduate division office, or the appropriate department or program director.

COURSES AND CREDIT

No one is permitted to attend a class for which he or she has not been properly registered. Credit is accumulated on the basis of quarter hours. The unit of credit is one quarter hour granted for 45 minutes of classroom work a week. The normal class extends over a ten-week period (or an accelerated five-week period in the summer). All courses carry four quarter hours of credit (2 2/3 semester hours), unless otherwise noted.

Students enrolled for eight or more quarter hours of credit are considered full-time. Those enrolled for less are considered part-time. For students fully employed, registration for two courses in a term is the suggested maximum.

Courses numbered 300 through 399 are advanced undergraduate courses. If listed in this Bulletin, they may be accepted for graduate credit within the limitations stipulated by the specific departmental chair or program director.
GRADES

Following is the key to the system of evaluating the academic achievement by the student of the educational objectives specified by the instructor in the course syllabus. These definitions apply to the straight letter grade. A plus grade represents slightly higher achievement than the straight letter grade. A minus grade represents slightly lower achievement than the straight letter grade.

A  The instructor judged the student to have accomplished the stated objectives of the course in an EXCELLENT manner.
B  The instructor judged the student to have accomplished the stated objectives of the course in a VERY GOOD manner.
C  The instructor judged the student to have accomplished the stated objectives of the course in a SATISFACTORY manner.
D  The instructor judged the student to have accomplished the stated objectives of the course in a POOR manner.
F  The instructor judged the student NOT to have accomplished the stated objectives of the course.

IN Temporary grade indicating that the student has a satisfactory record in work completed, but for unusual or unforeseeable circumstances not encountered by other students in the class and acceptable to the instructor is prevented from completing the course requirements by the end of the term. An incomplete grade may not be assigned unless the student has formally requested it from the instructor, and the instructor has given his or her permission for the student's receiving an incomplete grade.
R  Student is making satisfactory progress in a course that extends beyond the end of the term or in a project extending over more than one quarter.
W  Automatically recorded when the student's withdrawal is processed on or before the date designated in the academic calendar for such a withdrawal.
FX Student stopped attending course. This is an apparent withdrawal. The grade can be changed to a "W" grade by the college administration without consulting the instructor if it is determined that the student attempted to withdraw but followed incorrect procedures, or on other administrative grounds. If not administratively removed, it is scored in the grade point average the same as an "F." Students are advised to contact their college office to initiate the request to correct an FX grade. An FX grade may not be changed if it has remained on the student's record beyond twelve months except in extraordinary circumstances.

QUALITY POINTS

Quality points are awarded to a student in relation to the grade given and the number of quarter hours of credit attempted in the course. Quality points are awarded according to the following schedule:
A  4 times as many quality points as the credit hours assigned to the course.
A−  3.7 times the number of credit hours.
B+  3.3 times the number of credit hours.
B   3 times the number of credit hours.
B−  2.7 times the number of credit hours.
C+  2.3 times the number of credit hours.
C   2 times the number of credit hours.
C−  1.7 times the number of credit hours.
D+  1.3 times the number of credit hours.
D   1 quality point for each credit hour in the course.
GRADE REQUIREMENTS

You must achieve a minimal grade point average of 2.500 to graduate. A grade of D+ or D is unacceptable for graduate credit, and if earned in a required course, the course must be repeated or substituted as directed by the chair of the area of concentration. D+ or D grades remain on the academic record and are calculated into the cumulative grade point average.

PROBATION AND DISMISSAL

A student is subject to Probation as soon as his/her graduate GPA falls below 2.500. The student remains on Probation until four more courses are taken, at which time another evaluation is made. If, at that time, the student has failed to raise his/her GPA to the required level of 2.500 the student may be dismissed for poor scholarship, and prohibited from registering for additional course work.

A student who has been dismissed may, after a period of time, petition for reinstatement. The petition, addressed to dean of the respective graduate division, would provide information that would demonstrate a change in the student’s circumstances to an extent that would support successful completion of the student’s degree program. The dean’s decision, based upon the merits of the petition and the recommendation of the faculty of the student’s department, may, if favorable, stipulate conditions of reinstatement.

PLAGIARISM

Plagiarism is a major form of academic dishonesty involving the presentation of the work of another as one’s own. Plagiarism includes but is not limited to the following: The direct copying of any source such as written and verbal material, computer files, audio disks, video programs or musical scores, whether published or unpublished, in whole or in part, without proper acknowledgement that it is someone else’s. Copying of any source in whole or in part with only minor changes in wording or syntax even with acknowledgement.

Submitting as one’s own work a report, examination paper, computer file, lab report or other assignment which has been prepared by someone else. This includes research papers purchased from any other person or agency.

The paraphrasing of another’s work or ideas without proper acknowledgement.
Plagiarism, like other forms of academic dishonesty, is always a serious matter. If an instructor finds that a student has plagiarized, the appropriate penalty is at the instructor’s discretion. Actions taken by the instructor do not preclude the college or the University taking further punitive action including dismissal from the University.

For further information about the University’s policies on academic integrity please consult the Student Handbook.

**REGISTRATION PROCEDURES**

Students enrolled at any time during the previous calendar year are eligible to register.

Continuing students register by telephone using DePaul’s NROL telephone registration system. Complete instructions will be mailed to all continuing, new and readmitted students.

**REGISTRATION IN COURSES IN OTHER COLLEGES OR SCHOOLS**

Graduate students may be permitted to register for courses offered in other colleges or schools of the University. Contact your graduate office for specifics.

**RESIDENCE REGISTRATION**

Whether in residence or not, all admitted graduate students, master’s and doctoral levels who will use the facilities of the University (library, laboratory, etc.) or who will consult with faculty members regarding theses, dissertations or examinations, must be registered in each quarter.

**GRADUATION PROCEDURES**

**DEGREE REQUIREMENTS**

You must have successfully completed all of the general and specific degree requirements as listed in departmental or program sections of the bulletin under which you were admitted. Completed degree requirements can include the submitting of the dissertation or thesis or the research paper, examination scores, and, if necessary, grade changes. Students need to achieve a minimum grade point average of 2.500 to graduate.

**GRADUATION WITH DISTINCTION**

Conferred upon a student who has maintained a 3.75 grade point average in the degree program, and passes with distinction the final oral, written examination or master’s papers with distinction, where applicable.

**COMMENCEMENT**

Graduation ceremonies are held in June of each year. If you cancel or are ineligible to graduate, you must reapply for the next convocation.

**DIPLOMA**

Graduation ceremonies are symbolic. Your diploma will be mailed shortly after the convocation.

**DEADLINES**

Specific dates are established for submission to the graduate office of the completed graduation application and for completion of graduation requirements. Contact the office for specifics.
TUITION AND FEES

DePaul University is a not-for-profit corporation. No student pays the actual cost of his or her education. Tuition and fees are held at their present level through gifts of alumni, foundations, corporations, the Vincentian priests and brothers and friends of the University. All policies are under continual review. Therefore, the Board of Trustees reserves the right to change its charges as conditions require.

Tuition and fees for services and materials are for the academic year 1996-97 are applicable only to graduate students.

GRADUATE STUDENT TUITION, PER QUARTER HOUR
Computer Science, Telecommunications and Information Systems
100-200 series, per hour.................................................$275.00
300-700 series, per hour.................................................359.00

GENERAL FEES
Fees are not refundable
Graduate Application Fee..................................................$25.00
Readmission Fee................................................................5.00
Registration Fee.................................................................10.00
Delinquency Fee.................................................................100.00
Deferred Examination Fee
  On Designated Dates........................................................10.00
  At Times Not Designated.................................................20.00
Doctoral Dissertation Fee..................................................75.00
Thesis Binding (Per Copy)..................................................10.00
Each Transcript of Credit Fee.............................................5.00
Each Returned Check Fee....................................................25.00

* If a student gives the University a check that is returned by the bank upon which it is drawn marked "Not Sufficient Funds," "Payment Stopped," or "Account Closed," a $25.00 charge will be assessed for each such occurrence.

COMPUTER FEES
Students enrolling in courses that require computer resources may be assessed one or more computing fees. Revenues from these fees support the maintenance and upgrade of academic computing systems and facilities. Courses requiring these fees are noted in the class schedule. For some courses, instructors may require computer fees that are not shown in the schedule. These fees will be billed to the student's tuition account, as appropriate.

Student Internet Fee. DePaul students can purchase Internet access accounts for a non-refundable charge of $25.00 per term or $90.00 per year. Only active DePaul students are eligible to participate in this service. Faculty may require students to have Internet access for their courses. Students can sign up for Internet access through Academic Technology Development, 126 Richardson Library and 1300 Lewis Center. The Internet fee will be billed directly to the student's tuition account.

Student Computing Fee. Student enrolled in courses requiring student accounts on the UNIX or IBM system will be assessed a $25.00 fee per course.

PC Classroom Fee. Students enrolled in courses that meet for five or more sessions in one of the PC classrooms will be assessed a $25.00 fee per course.

MATERIAL FEES
See individual course descriptions for specific material fees.
TUITION PAYMENT POLICY

All tuition and fees are due DePaul University at the time of registration. All charges must be paid in-full by the payment date. The payment dates for each term of the 97-98 academic year are:

- **Friday, September 5, 1997—Fall Quarter**
- **Friday, December 12, 1997—Winter Quarter**
- **Friday, March 20, 1998—Spring Quarter**
- **Friday, June 12, 1998—Summer I**
- **Friday, July 17, 1998—Summer II**

Tuition charges for any course registrations after the payment date must be paid in-full at the time of registration.

Tuition is due by the payment date whether or not a bill has been received. If you have not received a bill, you may contact the Student Financial Services Office at (312) 362-8379 or (312) 362-6628 any time during business hours to determine the amount you are required to pay.

Payment must be received in the Cashier's Office or one of its depositories by the payment dates as indicated. Students may pay by check, money order or credit card (Visa, Master Card or Discover). Payments may be made to the Cashier's Office by mail or in person, or if paying by credit card, by phone (312) 362-6744. (Please note: If paying by mail, the University does not accept responsibility for delays in the U.S. Postal Service.)

Students whose accounts show a balance due after the date payment is required will be assessed a $100 delinquency fee and prohibited from future registration and receiving transcripts. Any requests appealing assessment of delinquency fees must be submitted in writing to the Student Accounts department.

BILLING

Bills will be printed and mailed when a registration is recorded. Payment must be made by the published payment date to avoid delinquency-fee assessment regardless of whether or not a bill is received. If a bill is not received, students may contact the Accounts Receivable Office at (312) 362-8379 for information relative to charges due. Revised bills will be issued for enrollment changes made after the initial registration.

For registrations and enrollment changes made after the payment date for a term, payment is due immediately. Although bills will be issued, to make timely payment students should contact Accounts Receivable for information regarding tuition charges.

If a student loses or misplaces his or her bill and needs a copy of the tuition account for records or for employer reimbursement, a printed copy of the account may be obtained from the Student Accounts department.

WITHDRAWAL

Students who must withdraw either from a course or from the University may do so in person at their home college, by letter addressed to the college, or by using the University's telephone registration system when appropriate. Withdrawals processed via NROL or in person are effective the day on which they are made. Withdrawals processed as a result of a letter are effective at the discretion of the college office. Simply ceasing to attend, or notifying the faculty, or nonpayment of tuition does not constitute a withdrawal of record and will result in academic as well as financial penalty.

Upon processing of the withdrawal request, the tuition charge for courses during the regular academic year will be reduced according to the following schedule; where the effective date is:

- Until ten business days after the beginning of the term ........................................... 100%
- After that date ................................................................................................. 0%
For courses of four weeks or less but more than two weeks duration no reduction will be granted after the first week of the term. For workshops or courses of two weeks or less duration, no refunds will be granted after the workshop or sessions begin.

For the Summer sessions, consult the schedule of tuition, fees and refunds listed in the Summer classes booklet.

Fees are not refundable.

**NOTE:** Students receiving financial aid are advised to contact a Financial Counselor to discuss the consequences of a withdrawal effecting academic progress and eligibility at DePaul University or any other school to which they may transfer.

**REFUNDS**

Students receiving financial aid in excess of direct University costs may receive a refund of a valid credit balance. Refund processing begins after financial aid has been applied to students’ University accounts, which is never earlier than ten days prior to the beginning of a term. Students who anticipate having a credit balance on their account (due to excess financial aid) may indicate how they wish to receive their funds by completing a “Refund Preference Form”, which is available at both the Student Accounts and Financial Aid offices. Excess financial aid refunds are generated automatically by one of three means: by direct deposit, check by mail, or check pick-up. Direct deposit refunds are the most secure and are therefore recommended by the University.

Students not receiving financial aid who have an account credit balance have the option of leaving the credit balance on the account to be applied toward future term expenses, or applying for a refund of the credit balance. Students who wish to apply for a refund should contact the Cashier’s Office, either in person or by phone. Refunds will be made by check, and will be mailed to the student at the mailing address on file with the University.

**GENERAL NOTES**

1. Registration cannot be accepted from a student with an unpaid balance from a prior term. Registration attempted under these circumstances is subject to cancellation.

2. Tuition and fees for courses audited are charged at the regular tuition rates. These must be paid at the time of registration and are not refundable.

3. If a student gives the University a check that is returned by the bank upon which it was drawn, marked “Not Sufficient Funds,” “Payment Stopped,” “Refer to Maker,” or “Account Closed,” a $25.00 charge will be assessed for each such occurrence. The University reserves the right to refuse acceptance of a personal check without prior notice.

4. Any foreign checks must be made payable in United States dollars or they will not be accepted by the University.

**FINANCIAL ASSISTANCE**

Several types of financial aid are available to graduate students through programs administered by the University graduate school departments. These include DePaul University graduate assistantships as well as special awards funded by foundations and corporations.

In addition, the DePaul Office of Financial Aid administers a variety of loan programs for which graduate students are eligible to apply.

**LOANS**

**DIRECT LOAN PROGRAM.** Federal Direct Loans are a new way for students to borrow money from the federal government to pay for university expenses. Under this program, the U.S. Department for Education makes loans, through schools, directly to students.

There are two types of Direct Loans—subsidized and unsubsidized. Eligibility for subsidized Direct Loans is based on financial need. Repayment is deferred until six months after you
graduate or cease to be enrolled at least half-time, and the interest is paid by the government while you are enrolled in school. Eligibility for unsubsidized Direct Loans is not based on financial need. You may borrow the cost of education minus all other financial aid you receive, up to the Direct Loan maximum. However, the interest must be either paid by you while you are enrolled, or be accrued and capitalized to the principal. Repayment of the principal is deferred until after you graduate or cease to be enrolled at least half-time.

The interest rate on the Direct Loan is variable and presently is 7.66 percent. It is adjusted annually on July 1. However, the interest rate cannot exceed 8.25 percent. In addition, there is an origination fee of 4 percent charged to the borrower and deducted from the loan proceeds before disbursement.

**GRADUATE STUDENTS**

<table>
<thead>
<tr>
<th>Subsidized Direct Loan Maximum</th>
<th>Total Direct Loan Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8,500</td>
<td>$18,500</td>
</tr>
</tbody>
</table>

Graduate students may borrow the subsidized Direct Loan up to the maximum indicated above, and may supplement this amount with the unsubsidized Direct Loan. The total combined subsidized and unsubsidized Direct Loan may not exceed $18,500.

**ALTERNATIVE FINANCING**

**DePaul University**

*The DePaul University Payment Plan (DePUPP)* is a budget payment option which allows students to pay their tuition, fees, and room and board in monthly installments over a nine month period. This service is available to all DePaul University students. It is not a loan program, there are no interest or finance changes, or credit or financial-needs requirements.

The student determines the budget amount for the plan. DePUPP requires a minimum budget amount of $750.00. The budgeted amount is the student's total estimated annual charges (tuition, fees, room and board) less the total estimated financial aid awards (annual scholarships, grants, loans). Books and personal expenses are not covered by this budget. The total amount budgeted under the plan will be divided equally over the number of months in the plan at the time you apply.

The plan period is from July to March with payments due the 15th of each month. The student may pay by check, money order, credit card (VISA, Master Card or Discover) or Electronic Funds Transfer.

Monthly billing statements will be sent to the student in advance of each payment due date. The statement will reflect charges and any payments or credits received since the last bill, the payment plan amount due by the 15th, and the current outstanding balance.

Students are urged to apply early. To participate in the nine month program, applications must be received by the Accounts Receivable Office no later than June 1. Applications made after this date must be accompanied by any past due payments to catch up to the regular schedule.

Applications received after September 1st but prior to October 1st will be processed for Winter/Spring term registrations only. Payments for the budgeted amount will be over a six-month period with the first payment due October 15th, and the last payment due March 15th.

Students who wish to participate in DePUPP should complete and submit a plan application to the Accounts Receivable Office with the application fee by the appropriate due date. An annual non-refundable fee of $30.00 is required for each application.

The application is valid for one academic year only. For each year a student wishes to participate in this program a new application must be submitted.

More detailed information regarding this program and plan applications are available from the Students Accounts Department and the Financial Aid Office.
Any questions regarding DePUPP should be directed to the Accounts Receivable Office (312) 362-8379, or you may write to: Accounts Receivable Office. DePaul University, I E. Jackson Blvd., Chicago, IL 60604.

The DePaul Payment Plan for Employer Reimbursement is a payment option for students who receive tuition reimbursement from their employers. It is administered through the Student Accounts office of Student Financial Services. The payment plan is designed to view coverage by an employer tuition reimbursement program as pending payment. Since employer reimbursement is generally issued at the end of a term, this payment plan allows the students covered by such an employer reimbursement plan to receive an extended payment due date for their tuition charges. Regardless of when the employer reimburses the student, the tuition due dates are not negotiable. Bills and grades will be issued to the students only and not to the employers. It is the responsibility of the student to provide their employers with copies of any documents their employer may require.

Eligibility Requirements. Students must submit the application and related fee by the application deadline. If there is a doubtful account history, past due balance, or insufficient employer documentation, the student will not be accepted into the program. If at any time the student falls delinquent in payment, the payment plan privilege is no longer available.

Eligible Courses. To be eligible to participate in this program, students must be enrolled in the traditional quarterly courses which are 10 weeks in duration (5-week Summer courses). Special seminars, extended courses, workshops, courses which require prepayment, audits and zero credit courses are not covered in this program.

Financial Aid. Students cannot apply for this program if they have also applied for financial aid. This program is designed to assist students who do not receive financial aid. There are no exceptions to this policy.

Payment. Regardless of when the employer reimburses the student, it is the student's responsibility to pay the balance in full on or before the tuition due date. Students who experience this delay from their employers typically pay tuition using a credit card. Students are responsible for paying their tuition accounts in full by the date whether they have completed the work for their courses whether or not they have received reimbursement from their employer. Tuition due dates are not negotiable and delinquent fees will apply to students who do not meet the tuition due date deadlines. Failure to meet the application agreement will jeopardize future participation in the program and may prevent future enrollment.

How to apply. Applications are available in the Student Financial Services Offices of Student Accounts and Student Aid, the college offices and suburban campuses. Submit the completed application and fee to the Payment Center by the required deadline. You will be notified only if your application has been denied. Do not return the application and fee to the college—this will delay processing and acceptance into the program.
FEES/APPLICATIONS

Term | Fee | Application Information
---|---|---
Fall, Winter and Spring terms | $100.00 | One time application for 3 quarters
Fall term only | 40.00 | Quarterly application
Winter term only | 40.00 | Quarterly application
Spring term only | 40.00 | Quarterly application
Summer Session I term | 40.00 | Quarterly application
Summer Session II term | 40.00 | Quarterly application

All fees are non-refundable.

Term | Application Deadline Date | Extended Payment Due Date
---|---|---
Fall, Winter, Spring (one time application) | Friday, August 29, 1997 | January 16, 1998
Fall quarter | Friday, August 29, 1997 | January 16, 1998
Winter quarter | Friday, December 5, 1997 | April 17, 1998
Spring quarter | Friday, March 13, 1998 | July 10, 1998
Summer Session I | Friday, June 5, 1998 | September 11, 1998
Summer Session II | Friday, July 10, 1998 | October 9, 1998

If mailing the applications, remember to include the fee. The University does not accept responsibility for delays in the U.S. Postal System.

For information about the Payment Plan for Employer Reimbursement, call the Student Accounts office (312) 362-6628.

PRIVATE AGENCIES

Other sources of loan funding are made available through private agencies for those who feel their needs have not been met sufficiently or those who are determined to be ineligible for other types of financial aid.

There are several long term loan programs available, include the TERI PEP Loan and the Nellie Mae Grad EXCEL Loan.

For more information about these and other alternative financing programs, contact the Office of Financial Aid.

PART-TIME EMPLOYMENT

Student Service employment takes the form of on-campus work with the full salary paid by DePaul. Any student wishing to work on campus may be eligible under this program as long as they are not receiving other need-based aid that would be affected by such earnings. If you would like to work on campus, check with the Student Employment Office at the Loop or Lincoln Park Campuses to see if you are eligible.

HOW TO APPLY

For more information about financial aid programs, contact DePaul University’s Office of Student Financial Services, 1 E. Jackson Blvd., Chicago, IL 60604. Telephone (312) 362-8091.

ASSISTANTSHIPS

The University provides a number of teaching, research and administrative assistantships to applicants accepted as degree-seeking, fully-admitted graduate students. Application should be made to the School of Computer Science, Telecommunications and Information Systems.

New applicants must have all their credentials (completed application form, admission fee, duplicate copies of transcripts and letters of recommendation) on file in the appropriate graduate office no later than the February 15 prior to Autumn quarter admission.

Announcement of Graduate Assistantships is generally made by June 1. Assistantships must be accepted or declined, in writing, by July 1.

Recipients will be assigned by their program directors or departments to activities appropriate for a teaching, research or administrative assistant.
ACADEMIC CALENDAR 1997-98

AUTUMN QUARTER
SEPTEMBER 1  MONDAY. Labor Day.
SEPTEMBER 5  FRIDAY. Autumn tuition payment due.
SEPTEMBER 10  WEDNESDAY. Autumn quarter evening classes begin.
OCTOBER 9-16  THURSDAY – THURSDAY. Mid-term week (optional).
OCTOBER 31  FRIDAY. Last day to withdraw from classes.
NOVEMBER 18  TUESDAY. Last day of Autumn quarter evening classes.
NOVEMBER 19-25  WEDNESDAY – TUESDAY. Final examinations for Autumn quarter evening classes.
NOVEMBER 26  WEDNESDAY. End of Autumn quarter.
NOVEMBER 26-29  WEDNESDAY EVENING – SUNDAY. Thanksgiving holiday.
DECEMBER 12  FRIDAY. Winter tuition payment due.

WINTER QUARTER
JANUARY 3  SATURDAY. Winter quarter Saturday classes begin.
JANUARY 5  MONDAY. Winter quarter evening classes begin.
JANUARY 31-FEBRUARY 6  SATURDAY – FRIDAY. Mid-term week (optional).
FEBRUARY 20  FRIDAY. Last day to withdraw from classes.
MARCH 13  TUESDAY. Last day of Winter quarter evening classes.
MARCH 14-20  SATURDAY-FRIDAY. Final examinations for Winter quarter classes.
MARCH 20  FRIDAY. End of Winter quarter. Spring tuition payment due.

SPRING QUARTER
MARCH 28  SATURDAY. Spring quarter Saturday classes begin.
MARCH 30  MONDAY. Spring quarter classes begin.
APRIL 10-12  FRIDAY – SUNDAY. Easter holiday — no classes.
APRIL 27-MAY 1  MONDAY – FRIDAY. Mid-term week (optional).
MAY 15  FRIDAY. Last day to withdraw from classes.
MAY 25  MONDAY. Memorial Day holiday — no classes.
JUNE 5  FRIDAY. Last day of Spring quarter classes.
JUNE 6-12  SATURDAY-FRIDAY. Final examinations for Spring quarter classes.
JUNE 12  FRIDAY. Spring quarter ends. Summer I tuition payment due.
JUNE 13-14  SATURDAY-SUNDAY. Commencement.

SUMMER SESSIONS
JUNE 15  MONDAY. Summer Session I begins.
JULY 3-4  FRIDAY-SATURDAY. Independence Day holiday.
No classes.
JULY 16  THURSDAY. Summer Session I ends.
JULY 17  FRIDAY. Summer Session II tuition payment date.
JULY 20  MONDAY. Summer Session II begins.
AUGUST 20  THURSDAY. Summer Session II ends.
INDEX

SCHOOL OF COMPUTER SCIENCE,
TELECOMMUNICATIONS AND
INFORMATION SYSTEMS 5-66

A
Artificial Intelligence 12

C
Computer Science,
Master of Science Admission 10
Concentrations 12
Elective Restrictions 15
Grade Requirements 15
Prerequisites 11
Concentrations
Artificial Intelligence 12
Computers Graphics 12
Computer Vision 13
Data Analysis 13
Database Systems 13
Data Communications 13
Personalized Concentration 15
Systems Foundations 14
Course Descriptions 42

D
Data Analysis 13
Database 13
Data Communications 13
Distributed Systems,
Master of Science Admission 16
Elective Restrictions 17
Grade Requirements 17
Doctoral Concentrations
Artificial Intelligence 36
Communications 36
Computer Information Systems 37
Data Analysis 37
Database Systems 37
Operating Systems 37
Programming Languages and
Environment 38
Software Engineering 38
Software Management 38
Theoretical Computer Science 37
Visual Computing 37

Doctoral Program,
Admission 35
Concentrations 36
Dissertation 39
Time Limitations 41

F
Facilities 9
Faculty 7

H
Human-Computer Interaction,
Master of Science Admission 18
Degree Requirements 18
Grade Requirements 19
Prerequisites 18

I
Information Systems,
Master of Science Admission 20
Elective Restrictions 22
Grade Requirements 22
Prerequisites 20

M
Management Information Systems,
Master of Science Admission 31
Prerequisites 31
Master's Programs
Computer Science 10
Human-Computer Interaction 18
Information Systems 20
Management Information Systems 31
Software Engineering 23
Telecommunication Systems 27

S
Software Engineering,
Master of Science Admission 23
Concentrations 24
Elective Restriction 25
Grade Requirements 26
Prerequisites 23
INDEX

T
Telecommunication Systems,
  Master of Science Admission 27
  Concentrations 29
  Elective Restrictions 29
  Grade Requirement 30
  Prerequisites 27

GRADUATE HANDBOOK 70-92

A
Academic Counseling 82
Accreditation 74
Administration, General 76
Alternative Financing 89
Assistantships 91

B
Billing 87
Board of Trustees 76

C
Calendar 92
Campus Locations 71
Career Planning 73
Commencement 85
Computer Facilities 73
Course Load 82
Course Numbering 82
Credits 82

D
DePaul Payment Plan 90
DePupp Plan 89
Dismissal 84

E
Educational Records, Access to 82

F
Fees 86
Financial Assistance 88

G
Grades 83
Graduate Courses 82
Graduation Procedures 85

H
Honor Societies 75
Housing 74

I
Jobs, Part Time 91

L
Libraries 71
Loans 88

P
Payment 87
Plagiarism 84
Probation 84

R
Registration 85
Regulations, Academic 82
Refunds 88
Residence Registration 85

S
Student Responsibility 82

T
Tuition and Fees 86

U
Undergraduate Courses 82

W
Withdrawal 87
DePaul, a Catholic university, takes its name from St. Vincent dePaul. The religious community founded by Vincent, commonly known as 'Vincentians', opened the university and endowed it with a distinctive spirit: to foster in higher education a deep respect for the God-given dignity of all persons, especially the materially, culturally, and spiritually deprived; to instill in educated persons a dedication to the service of others. In each succeeding generation the women and men of DePaul have pursued learning in this spirit of Vincent dePaul.