

2003-2004

DEPAUL UNIVERSITY COURSE CATALOG

SCHOOL OF COMPUTER SCIENCE,

TELECOMMUNICATIONS AND

INFORMATION SYSTEMS

GRADUATE PROGRAMS

SCHOOL OF COMPUTER SCIENCE, TELECOMMUNICATIONS AND INFORMATION SYSTEMS

ADMINISTRATION

HELMUT EPP, PH.D.

Dean

GREGORY BREWSTER, PH.D.

Associate Dean

MARTIN KALIN, PH.D.

Associate Dean

LINDA V. KNIGHT, PH.D.

Associate Dean

DAVID MILLER, PH.D.

Associate Dean

ANNE B. MORLEY

Assistant Dean

TERRY SKWAREK

Director, Institute for Professional Development

Assistant Dean

PHILOSOPHY

FACULTY

PURPOSES

FACILITIES

ADMISSION

PROGRAMS

DOCTOR OF PHILOSOPHY

Computer Science

MASTER OF ARTS

Applied Technology

Information Technology

MASTER OF SCIENCE

Computer Graphics and Animation

Computer Science

Computer, Information and Network Security

Distributed Systems

E-Commerce Technology

Human-Computer Interaction

Information Systems

Instructional Technology Systems

Management Information Systems

Software Engineering

Telecommunication Systems

JURIS DOCTORATE AND MASTER OF ARTS

JURIS DOCTORATE AND MASTER OF SCIENCE

COURSES

To obtain a Course Catalog 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 Course Catalog (USPS = 154-260), No. 5, July 1, 2001. 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 Course Catalog, 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: John Glatz

Note: The University reserves the right to revise its Course Catalogs and Schedules.

CONTENTS

CAMPUS MAP

SCHOOL OF COMPUTER SCIENCE, TELECOMMUNICATIONS AND INFORMATION SYSTEMS

Philosophy

Faculty

Purposes

Facilities

Admission Procedures

Admission Classifications

Doctor of Philosophy in Computer Science

Master of Arts in Applied Technology/ Joint Degree

Master of Arts in Information Technology

Master of Science in Computer Graphics and Animation

Master of Science in Computer Science

Master of Science in Distributed Systems

Master of Science in E-Commerce Technology

Master of Science in Human-Computer Interaction

Master of Science in Information Systems

Master of Science in Instruction Technology Systems

Master of Science in Instructional Technology

Master of Science in Management Information Systems/ Joint

Master of Science in Software Engineering

Master of Science in Telecommunication Systems

Master of Science in Computer, Information and Network Security

Juris Doctorate and Master of Arts / Joint Degree

Juris Doctorate and Master of Science / Joint Degree

Course Descriptions

THE UNIVERSITY

Campuses

Libraries

Technology and Computer Resources

Career Center

Residence Life

Accreditation

Honor Societies

Board of Trustees

General Administration

ACADEMIC INFORMATION AND REGULATIONS

Master's Program Requirements

Doctoral Program Requirement

Student Responsibility

Academic Counseling

Courses and Credit

Grades

Probation and Dismissal

Plagiarism

Registration Procedures

Graduation Procedures

Commencement

FINANCIAL POLICIES AND PROCEDURES

Tuition and Fees
Payment Policies
Financial Assistance
Alternative Financing
DePUPP program

CALENDAR

Graduate Academic Calendar

STATEMENT OF VINCENTIAN CHARACTER

CAMPUS LOCATIONS LOCATIONS

The School of Computer Science, Telecommunications and Information Systems (CTI) offers courses at our Loop and Lincoln Park Campuses as well as at convenient suburban locations.

LINCOLN PARK CAMPUS

2320 North Kenmore Avenue
Chicago, Illinois 60614

LOOP CAMPUS

243 South Wabash
Chicago, Illinois 60604
312-362-8381
(full program of course offerings)

BARAT CAMPUS

700 East Westleigh Drive
Lake Forest, Illinois 60045
(selected course offerings)

LAKE FOREST CAMPUS

150 Field Drive
Lake Forest, Illinois 60045
(selected course offerings)

NAPERVILLE CAMPUS

150 West Warrenville Road
Naperville, Illinois 60566
(selected course offerings)

O'HARE CAMPUS

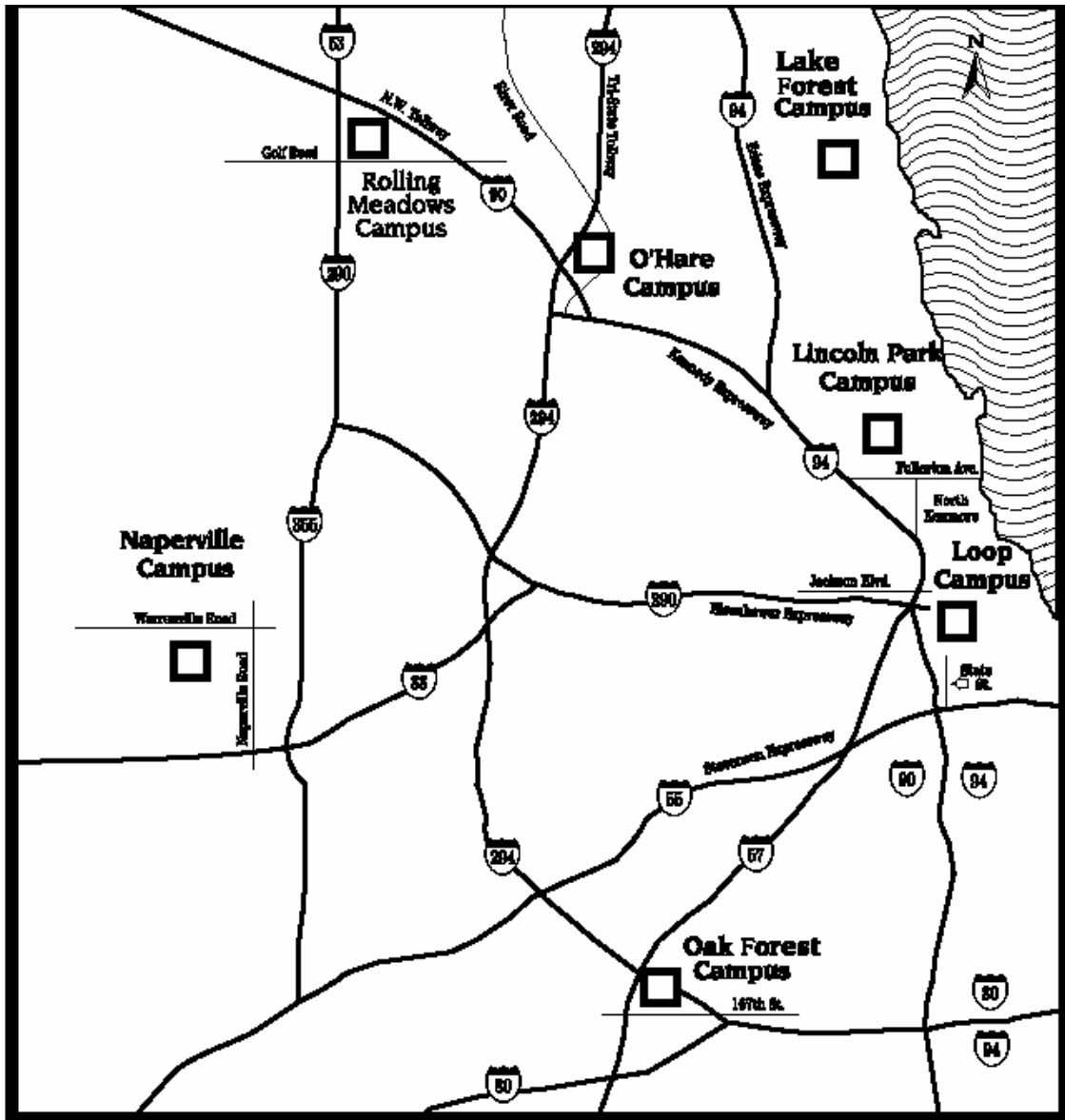
3166 River Road
Des Plaines, Illinois 60018
(selected course offerings)

ROLLING MEADOWS CAMPUS

2550 West Golf Road
Meadows Corporate Center, East Tower
Rolling Meadows, Illinois 60
(selected course offerings)

Students may take courses at any of the locations. Currently all students must complete at least part of their degree program at the Loop Campus. However, as the University continues to expand the number and variety of courses at the suburban campuses, most students will be able to take increasing advantage of these locations.

CAMPUS MAP



PHILOSOPHY

DePaul University, founded on Judeo-Christian principles, continues to assert the relevance of these principles through higher education to modern men and women. 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 scholarship 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.,
Professor and Dean
Northwestern University

HANI ABU-SALEM, PH.D.,
Associate Professor
Illinois Institute of Technology

OLAYELE ADELAKUN, PH.D.,
Assistant Professor
Turku School of Economics & Business Adm.

EHAB AL-SHAER, PH.D.,
Assistant Professor
Old Dominican University

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

DAVID ANGULO, M.S.,
Instructor
Loyola University Chicago

ANDRÉ BERTHIAUME, PH.D.,
Associate Professor
University of Montreal

GIAN MARIO BESANA, PH.D.,
Associate Professor
University of Notre Dame

GREGORY BREWSTER, PH.D.,
Associate Professor and Associate Dean
University of Wisconsin, Madison

JACEK BRZEZINSKI, PH.D.,
Assistant Professor
DePaul University

DALE BUCHHOLZ, M.S.,
Instructor
DePaul University

ROBIN BURKE, PH.D.,
Associate Professor
Northwestern University

ALAN BURNS, M.S.,
Instructor
Kent State University

ROYMIECO CARTER, M.F.A.,
Assistant Professor
Pennsylvania State University

SUSY 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.,
Associate Professor
University of Maryland Baltimore County

KAMAL DAHBUR, PH.D.,
Assistant Professor
DePaul University

LUCIA DETTORI, PH.D.,
Assistant Professor
University of Paris XI

MASSIMO DIPIERRO, PH.D.,
Assistant Professor
University of Southampton, UK

CLARK ELLIOTT, PH.D.,
Associate Professor
Northwestern University

KHALED EL-ZAYYAT, PH.D.,
Associate Professor
University of Reno

XIAOWEN FANG, PH.D.,
Assistant Professor
Purdue University

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

MICHAEL FRIES, PH.D.,
Assistant Professor
State University of New York at Buffalo

JACOB FURST, PH.D.,
Assistant Professor
University of North Carolina at Chapel Hill

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

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

JANE HUANG, PH.D.,
Assistant Professor
University of Illinois at Chicago

LOUIS IBARRA, PH.D.,
Assistant Professor
University of Victoria

RADHA JAGADEESAN, PH.D.,
Professor
Cornell University

ALAN JEFFREY, PH.D.,
Associate Professor
University of Oxford

XIAOPING JIA, PH.D.,
Professor
Northwestern University

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

MARTIN KALIN, PH.D.,
Professor and Associate Dean
Northwestern University

IYAD KANJ, PH.D.,
Assistant Professor
Texas A & M University

VINCENT KELLEN, B.A.,
Instructor
DePaul University

MICHAEL KENNISTON, PH.D.,
Assistant Professor
Stanford University

YAKOV KESELMAN, M.S.,
Assistant Professor
Rutgers University

LINDA KNIGHT, PH.D.,
Associate Professor and Associate Dean
DePaul University

JEAN-PHILIPPE LABRUYERE, M.S.,
Instructor
Illinois Institute of Technology

GLENN LANCASTER, PH.D.,
Associate Professor
University of California, Irvine

ANTHONY LARRAIN, M.S.,
Instructor
University of Illinois at Chicago

STEPHEN LUECKING, M.F.A.,
Professor
Miami University

EVELYN LULIS, M.S.,
Assistant Professor
Illinois Institute of Technology

STEVEN LYTIMEN, PH.D.,
Professor
Yale University

WILFREDO MARRERO, PH.D.,
Assistant Professor
Carnegie Mellon University

JOHN MCDONALD, PH.D.,
Assistant Professor
Northwestern University

CRAIG MILLER, PH.D.,
Associate Professor
University of Michigan

DAVID MILLER, PH.D.,
Associate Professor and Associate Dean
University of Chicago

DANIEL MITTLEMAN, PH.D.,
Associate Professor
The University of Arizona

BAMSHAD MOBASHER, PH.D.,
Associate Professor
Iowa State University

JAMI MONTGOMERY, PH.D.,
Assistant Professor
Illinois Institute of Technology

JOSEPH MORGAN, M.S.,
Instructor
DePaul University

ASHLEY MORRIS, PH.D.,
Assistant Professor
Tulane University

THOMAS MUSCARELLO, PH.D.,
Assistant Professor
University of Illinois at Chicago

MAKOTO NAKAYAMA, PH.D.,
Assistant Professor
University of California, Los Angeles

NEDJLA OUGOUAG, PH.D.,
Assistant Professor
University of Illinois at Urbana Champaign

LJUBOMIR PERKOVIĆ, PH.D.,
Assistant Professor
Carnegie Mellon University

JOSEPH PHILLIPS, PH.D.,
Assistant Professor
University of Michigan

CORIN PITCHER, PH.D. ,
Assistant Professor
University of Oxford

DANIELA RAICU, PH.D.,
Assistant Professor
Oakland University

JAMES RIELY, PH.D.,
Assistant Professor
University of North Carolina at Chapel Hill

JOHN ROGERS, PH.D.,
Associate Professor
University of Chicago

LORILEE SADLER, M.S.,
Assistant Professor
Indiana University

MARCUS SCHAEFER, PH.D.,
Assistant Professor
University of Chicago

ERIC SCHWABE, PH.D.,
Associate Professor
Massachusetts Institute of Technology

ERIC SEDGWICK, PH.D.,
Assistant Professor
University of Texas

RAFFAELLA SETTIMI, PH.D.,
Assistant Professor
University of Perugia

AMBER SETTLE, PH.D.,
Associate Professor
University of Chicago

PAUL SISUL, M.DIV.,
Instructor
DeAndreis Institute of Theology

ADAM STEELE, PH.D.,
Assistant Professor
Concordia University

THERESA STEINBACH, M.B.A., M.S.,
Instructor
DePaul University

HAROLD STREETER, M.S.,
Instructor
Brown University

NORMA SUTCLIFFE, PH.D.,
Assistant Professor
University of California at Los Angeles

CHARLES SYKES, M.S.,
Instructor
DePaul University

NORIKO TOMURO, PH.D.,
Assistant Professor
DePaul University

CURT WHITE, PH.D.,
Associate Professor
Wayne State University

JAMES WHITE, M.B.A.,
Instructor
Dominican University

PETER WIEMER- HASTINGS, PH.D.,
Assistant Professor
University of Michigan, Ann Arbor

CHARLES WILCOX, B.A.,
Instructor
Southern Illinois University

ROSALEE WOLFE, PH.D.,
Professor
Indiana University

YONGHE YAN, PH.D.,
Assistant Professor
The University of Hong Kong

JAMES YU, PH.D.,
Assistant Professor
Purdue University

LU ZHANG, PH.D.,
Assistant Professor
Iowa State University

PURPOSES

The School of Computer Science, Telecommunications and Information Systems (CTI) offers graduate level, professional education in these areas: artificial intelligence, collaborative technologies, computer science, computer graphics, computer vision, data analysis, database, data communications, data warehousing, distributed systems, e-commerce technology, human-computer interaction, information systems, management information systems, networking, project management, software engineering, systems foundation, systems development, telecommunication systems, and visual computing. 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 System 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 in the following:

- Requirements Engineering Lab
- Mobile E-Commerce Lab
- Solid Objects Lab
- Software Research Lab
- Multimedia Networking Lab
- Artificial Intelligence Lab
- American Sign Language Lab
- E-Commerce Technology Lab
- Information Systems Lab

PROFESSIONAL DEVELOPMENT

The School of CTI 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 individual 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.

A team of instructors teaches each certificate program. Instructors include 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.

ADMISSION AND READMISSION PROCEDURES

Procedures for admission to the School of CTI involve submission of a completed application form and supporting credentials, payment of admission fee, observance of deadlines and receipt of the Dean's admission letter.

Applications may be submitted online at *www.cs.depaul.edu*.

Application Form: Applicants may obtain a graduate application form by mailing a request to the School of CTI Admissions Office, DePaul University, 243 South Wabash, Chicago, Illinois, 60604; by filling out a form at our website at www.cs.depaul.edu, or by calling (312) 362 8381. The applicant should include his/her proposed program of study in the request.

Application deadlines for MS applicants are:

August 1 for Autumn Quarter

November 15 for Winter Quarter

March 1 for Spring Quarter

May 1 for Summer Quarter

Students educated and residing outside the United States must submit an application and all supporting credentials no later than:

June 1 for Autumn Quarter

October 1 for Winter Quarter

January 1 for Spring Quarter

April 1 for Summer Quarter

Supporting Credentials: Official transcripts of the applicant's 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 attention of CTI Admissions, DePaul University. The applicant is advised to make his/her request as early as possible, because there is frequently a delay in the forwarding of transcripts. A DePaul senior applying to the Graduate School should request that ARC forward an official transcript to CTI Admissions.

NOTE: Programs may require additional supporting credentials. Please consult the specific programs listed on this website to determine what additional materials are required for admission to the specific course of graduate study.

Admission Fee: A check or money order payable to DePaul University in the amount of \$25.00 must accompany the completed application form. This fee is nonrefundable. The applicant's full name must appear on the check or money order.

Dean's Admission Letter: The Dean will notify the applicant by letter of his/her 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. The review process is done on a rolling basis.

INTERNATIONAL STUDENT ADMISSION

The admission requirements stated above also apply to international students. Applicants educated outside of the United States 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 I-20 form are issued only after admission. Please visit our web site at www.cs.depaul.edu for further details about I-20s.

International applicants are strongly urged to apply as early as possible. There are usually long delays in the forwarding of all supporting credentials

ADMISSION PROCEDURES

11SSION PROCEDURES

12

READMISSION PROCEDURES

Applicants who have been admitted to the School but do not enroll in the University within one year of the date on their letter of admission must complete an application for readmission. There is a \$5.00 service fee for processing a readmission.

Former CTI students must also apply for readmission if they were previously enrolled in a graduate program in the School of CTI, but have not been in attendance for a period of one calendar year. If more than four calendar years have elapsed since the student has been in attendance, the student must submit a new application for admission, including the \$25.00 application fee. An official copy of transcripts recording scholastic work completed since the last enrollment at DePaul University must be submitted. Students are held to the degree requirements that are in effect at the time of readmission.

DEPAUL SENIORS

Seniors in any of the undergraduate colleges or schools of DePaul University are eligible to apply for admission to the School of CTI while completing their undergraduate program.

ADMISSION CLASSIFICATIONS

Applicants are admitted to the School of CTI 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 classified as degree-seeking students in either of two ways: conditional or full. A conditionally admitted applicant is eligible for reclassification to full degree-seeking status when the Prerequisite Phase is satisfied by coursework or waiver. (See Reclassification Procedures below.) The minimum requirements for conditional degree-seeking status are: possession of a bachelor's degree conferred by a regionally accredited institution, scholastic achievement in undergraduate studies indicating a capacity to successfully pursue a specific program of graduate study, submission of all required supporting credentials to the School office, and conditional approval by the program director of the applicant's proposed course of graduate study. The minimum requirements for full degree-seeking status include the requirements stated for conditional degree-seeking status, as well as fulfillment of all program-specific prerequisite phase requirements.

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, apply for reclassification to degree-seeking status. The minimum requirements for this status are possession of a bachelor's degree conferred by a regionally accredited institution, scholastic achievement in undergraduate studies indicating a capacity to pursue successfully graduate course work, submission to the School office of all required supporting credentials, a letter of intent addressed to the Dean, and approval by the Dean. Students pursuing non-degree status will also have to submit a completed application, including a check or money order made payable to DePaul University in the amount of \$25.00 for the application fee. The application fee is nonrefundable.

When students with non-degree seeking status file for reclassification to degree-seeking status, the program director may recommend, in writing, to the Dean that a maximum of three courses (12 quarter hours) that were completed by the student under the non-degree-seeking status be counted toward fulfillment of the advanced degree requirements.

In addition, non-degree seeking students will not have access to enroll in courses numbered 420 and higher on their own. They must seek approval from the instructors of the courses in which they wish to enroll. The enrollment transaction will be processed by the advising office at the request of the instructor.

13

Student-at-Large

The School of CTI 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 school Dean. A student-at-large must submit an application for admission to the School office (including the \$25.00

application fee). 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.

RECLASSIFICATION PROCEDURES

Once a student fulfills the conditions of admission, the student must file a Change of Status application with the School office so his/her status can be updated to full degree-seeking status. A student must also file a Change of Concentration application if he/she decides to change his/her major. These requests can be filed through MyCTI. Students are held to the degree requirements that are in effect at the time the student changes his/her major.

GRADUATE CREDIT TRANSFER

Credit transfer in degree programs leading to the master's or doctoral degree is ordinarily 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. Should an approval be granted, students are allowed to transfer a maximum of two graduate level courses. Additionally, these courses cannot have been used in the attainment of a previous degree.

DOCTORAL PROGRAM ADMISSION REQUIREMENTS

The School of CTI offers a Doctor of Philosophy in Computer Science. The Doctor of Philosophy is the highest academic degree offered by DePaul University. This degree shows that the recipient has attained great proficiency in several broad areas of learning and has a demonstrated capability to explore and advance a particular field of knowledge through independent research. In order to be considered for admission to the doctoral program, students must:

- Hold a master's degree in Computer Science or an allied field or hold a Bachelor of Science degree with exceptional promise for completion of the Ph.D.
- Submit three letters of recommendation.
- Submit a written statement describing their accomplishments, goals and interests.
- Submit a completed application form.
- Submit an official score report of the Graduate Record Examination (GRE).

Applicants educated outside of the United States must demonstrate English proficiency with a TOEFL score of 580 or greater. A Ph.D. Admissions Committee determines which applicants will be admitted to the program. Because the School may only admit a limited number of students to the program, meeting the admission standards does not guarantee acceptance. Detailed program specifications can be found in the Ph.D. program section.

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

The Ph.D. program in Computer Science offers an opportunity for exceptional students to pursue substantial research in the computer sciences and related areas. The program is highly selective and is purposefully kept small so that each Ph.D. student can receive substantial advising and mentoring from CTI faculty. To earn a Ph.D. degree, a student must demonstrate breadth of knowledge in at least three research areas and significant depth in a chosen dissertation area. In addition, the student must conceive, write and defend a Ph.D. dissertation representing a significant and original contribution to current academic research as demonstrated by a public dissertation defense and publication in established peer-reviewed academic conferences and/or journals.

In keeping with the CTI philosophy of blending academic and professional pursuits, full-time employed students will be considered for admission as part-time doctoral students. However, these applicants must have sufficiently flexible work schedules to allow them to attend required meetings and academic seminars that occur during daytime working hours throughout their degree program. In addition, many working students will find that they must take a leave of absence or cut back to part-time employment for some time period during the research and candidacy phases of the degree program.

- Admission Requirements
- Inquiry Phase
- Research Phase
- Candidacy Phase
- Detailed Degree Requirements
-

Admission Requirements

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

- Hold a master's degree in Computer Science or an allied field.
- 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 an official score report of the Graduate Record Examination (GRE) general examination.
- Applicants educated outside of the United States must demonstrate English proficiency with a TOEFL score of 580 or greater.

Students without a master's 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 Master's of Science in Computer Science program. 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 will then be formally admitted into the doctoral program. Note: It is not the policy of the School to award a master's degree to a student enrolled in the Ph.D. program.

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

Students employed outside of the University can be admitted as part-time doctoral students. Students who can devote themselves full time to their doctoral studies can be admitted as full-time doctoral students. Only full-time students will be considered for substantial financial aid stipends.

Completeness of credentials

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

Overview of the Degree

The Doctor of Philosophy in Computer Science degree follows three phases, which may overlap in time:

- **Inquiry** **Phase:**
Coursework, initial research projects and successful completion of three Breadth Examinations.
- **Research** **Phase:**
Focused research leading to successful completion of a Dissertation Proposal. Upon completion of all requirements, the student is admitted to Candidacy.
- **Candidacy** **Phase:**
Further research, writing and defense of the Ph.D. dissertation.

The Inquiry Phase

During the Inquiry Phase a student will complete coursework in various areas of Computer Science to gain breadth and to discover the area in which dissertation research is to be done. Since considerable thought should be given to choosing the area in which the student wishes to do research in the future, the student may wish to do small research projects during this time period to explore where their research interests lie.

Three Breadth Examinations must be successfully completed. At least one of the 3 breadth exams must be in one of the core areas of computer science, namely, Artificial Intelligence, Database Systems, Operating Systems, Programming Languages, and Theoretical Computer Science. Furthermore, at least one breadth exam must be in the student's primary area of dissertation research. The choice of breadth exams must be approved by the student's PhD advisor. These examinations can be taken either during the Inquiry Phase or during the Research Phase. Each Breadth Examination will verify that the student has knowledge sufficient to teach an introductory graduate course in that area. A student must pass all three breadth exams with at most one re-take opportunity per exam. Re-takes of breadth exams must be approved by the PhD Committee.

A Ph.D. student enters the Research Phase when he or she has chosen an area in which to do dissertation research and has found a faculty member willing to act as his or her Dissertation Advisor. The amount of time spent in the Inquiry Phase will vary from student to student, but will typically be several years. The research phase may overlap with the inquiry phase, in fact, students are strongly encouraged to begin their research, under the supervision of a faculty PhD advisor, as early as possible upon entering the program.

The Research Phase

In this phase the doctoral student, in conjunction with his or her Dissertation Advisor, will conduct extensive readings in academic texts, journals and conference proceedings to become an expert in the chosen research area.

The student is responsible for approaching a faculty member to act as their Dissertation Advisor. The faculty member may request that the student perform additional projects or research before agreeing to be the Dissertation Advisor. The student and Dissertation Advisor then work together to choose three additional faculty which, together with the Dissertation Advisor, form 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 School of CTI whose expertise is pertinent to the topic of the dissertation. The members of this committee must be approved by the School's Ph.D. Committee.

Once the student has enough preliminary results that the student and 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 a public defense of the dissertation proposal. The student will provide an oral presentation of current results and future research goals at this defense. The proposal will be approved only if the Dissertation Committee agrees that the work that is planned will constitute an acceptable Ph.D. dissertation. The committee may recommend that the student repeat the proposal at a later date. The dissertation committee may require additional components in conjunction with proposal defense to test the student's depth of knowledge in the specific area of dissertation research.

A student generally enters the Candidacy Phase (and is considered a Candidate) after a successful defense of the Dissertation Proposal (see the full requirements for Candidacy below).

The Candidacy Phase

In the Candidacy Phase the student performs the research promised in the dissertation proposal and writes the dissertation. Ph.D. dissertations in Computer Science are typically 100 to 300 pages in length and must represent a significant and original body of work.

Except in very unusual situations, the student will be required to publish some portion of the dissertation as an academic paper in a refereed journal or conference before completing the degree. This will demonstrate that the significance of this work is recognized in academic communities outside DePaul University.

After the dissertation has been written, the student will provide a copy to all members of the Dissertation Committee. After reading the dissertation, the Dissertation Committee must recommend whether or not a public dissertation defense should proceed. In particular, the members of the Dissertation Committee will determine whether the completed dissertation embodies the work that was promised in the dissertation proposal. The committee may recommend modifications or additional research to be completed before the defense can take place. Once the Dissertation Committee agrees that the defense should take place, a date will be scheduled for the dissertation defense. After the defense, the Dissertation Committee will determine whether all work has been satisfactorily completed or additional work or modifications must be made.

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 abstract to the School. Contact the Student Services office for additional information regarding procedures to follow for binding the dissertation.

Detailed Degree Requirements

Course Requirements

Ph.D. students with a master's degree are required to complete a minimum of 60 credits (typically 15 courses) of graduate classes. These credits must include at least 48 credits of courses in the 420-599 range, including CSC 426 Values and Computer Technology, and 12 credits of CSC 699 Research. Students may enroll in CSC 699 only after completion of the Breadth Examinations. Conditionally admitted students must complete an additional 52 credits (typically 13 courses) of graduate classes, including at least 36 credits of courses in the 420-599 range. 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.

Student progress will be evaluated annually. Students must maintain a grade point average of 3.5 or better to remain in good standing in the program. Any course grade below B- is unsatisfactory and will not be counted toward degree requirements. The Ph.D. Committee will ask a student to withdraw from the doctoral program if the members judge that that student is not progressing satisfactorily toward the degree.

Continuous Enrollment

Prior to candidacy, a student must continuously enroll for at least one academic credit per quarter during every Autumn, Winter and Spring quarter. A student may apply to the Ph.D. committee for a leave of absence from this continuous enrollment requirement if exceptional circumstances arise. After admission to candidacy, a student must continuously enroll for at least one course per quarter during every Autumn, Winter and Spring quarter, but may enroll for CSC 701 Candidacy Continuation (0 academic credits) with advisor's approval.

Admission to Candidacy

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

Residency: Three quarters of full-time study must be completed at DePaul University beyond the master's level. Full-time study is defined as registration for a minimum of eight credit hours (typically 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 Examinations: Pass three Breadth Examinations.

Defense of Proposal: Successfully defend a Dissertation Proposal.

Doctoral Examinations

Breadth examinations are typically offered twice each year. Applications to take these exams must be completed three months prior to the exam date. At least one of the 3 breadth exams must be in one of the core areas of computer science, namely, Artificial Intelligence, Database Systems, Operating Systems, Programming Languages, and Theoretical Computer Science. Furthermore, at least one breadth exam must be in the student's primary area of dissertation research. The choice of breadth exams must be approved by the student's PhD advisor. Must pass all three breadth exams with at most one re-take opportunity per exam. Requests to re-take one or more breadth exams must be approved by the PhD Committee. Any student who fails to satisfy the breadth exam requirements will be asked to leave the program.

Reading lists and copies of previous Breadth examinations are available. The reading list for each examination defines the specific subject areas covered by that examination.

Examinations are offered in each of the following areas:

- Artificial Intelligence
- Communications Networks
- E-commerce Technology
- Theoretical Computer Science
- Information Systems
- Data Analysis
- Database Systems
- Human Computer Interaction
- Operating Systems
- Visual Computing
- Programming Languages
- Software Engineering
- Software Management
- Program Time Limitations

For part-time doctoral students, time limits are as follows:

No more than four years between admission to the doctoral program and completion of Breadth Examinations.

No more than two years between completion of Breadth Examinations and admission to Candidacy.

No less than eight months and no more than five years between admission to Candidacy and the dissertation defense.

For full-time doctoral students, time limits are as follows:

No more than three years between admission to the doctoral program and completion of Breadth Examinations.

No more than two years between completion of Breadth Examinations and admission to Candidacy.

No less than eight months and no 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.

ARTS IN APPLIED TECHNOLOGY

The Master of Arts in Applied Technology (MAAT) is designed for experienced non-IT managers who wish to acquire advanced technical skills in a highly focused area, in combination with enhanced understanding of the larger organizational, economic, and social contexts within which these technical skills are practiced. The MAAT offers Areas of Specialization in either Applied Information Systems (AIS) or Applied Telecommunications Systems (ATS). This new degree program is being offered jointly by CTI and the School for New Learning (SNL), DePaul's nationally recognized college for adult learners; and students work with advisors from both colleges throughout their program. Students entering the MAAT must have an undergraduate degree with an appropriate GPA, although it need not have been in a technology-related field. They must also have had experience in the workplace sufficient to define the technological requirements of an organization as well as to understand the organizational system itself (generally, at least three years), and must have access to a worksite "laboratory" within which the application of learning can take place. Prospective students can find more information on this degree at the SNL website.

The curriculum consists of three primary components:

- An individualized Area of Specialization in either Applied Information Systems or Applied Telecommunications Systems offered through CTI; the Area of Specialization combines CTI coursework with on-the-job application of this coursework;
- A series of Liberal Learning Seminars offered through SNL which are designed to develop the skills of communication, interpersonal facility, problem-solving, analytical and systems thinking, ethical decision-making, and self-managed learning; and
- A Culminating Project which is designed to integrate the technical and liberal learning components of the program through the design and/or implementation of a major professional project in the workplace.

Prerequisite Phase

The Prerequisite Phase is intended to insure that all students enter CTI coursework with adequate preparation for successful work. Because the MAAT program admits only experienced practitioners, each student's background and abilities will be assessed jointly by members of both the CTI and SNL faculty. Students may receive waivers for the Prerequisite Phase based on prior experience, previous coursework, or performance on a Graduate Assessment Examination (GAE). The following coursework constitutes the Prerequisite Phase for each Area of Specialization:

Applied Information Systems

CSC 211 Programming in Java I
CSC 240 Personal Computing for Programmers
or CSC 319 Database Technology

Applied Telecommunications

CSC 211 Programming in Java I
CSC 240 Personal Computing for Programmers
or CSC 319 Database Technology
TDC 411 Computers in Information Systems and Telecommunications

Core Knowledge Phase

Students must complete the three core courses in their Area of Specialization:

Applied Information Systems:

IS 421 Information Systems Analysis
IS 422 Information Systems Design
IS 483 Information Services and Operations

Applied Telecommunications

TDC 461 Basic Communication Systems

TDC 462 Data Communications
TDC 463 Information Systems Management

Advanced Phase

After completing the courses in the Core Phase, students select three Advanced Phase courses from among the following:

Applied Information Systems

IS 482 Legal Aspects of Information Technology
IS 450 Enterprise Systems Implementation
IS 511 Social Issues of Computing
IS 512 Groupware and Virtual Collaboration
IS 540 Global Information Technology

Applied Telecommunications

TDC 464 Voice Communication Networks
TDC 476 Economics of Telecommunications
TDC 511 Telecommunications Practicum
TDC 512 Cellular and Wireless Telecommunications
SNL Liberal Learning Seminars

All MAAT students are assigned to a cluster of approximately 20 students. These students remain together through the seven quarters of SNL seminar work. **For more information see the School of New Learning.**

Ordinarily, a student will take one SNL seminar concurrently with one CTI course to encourage the integration of technical and liberal learning throughout the program.

Culminating Project

The Culminating Project is an independent project that demonstrates a student's ability to integrate both technical expertise and organizational acumen. Typically, it involves the identification of a practice-based problem, the development and implementation of an appropriate intervention, and the evaluation of the strengths and limitations of the intervention. Normally, it is undertaken after all other work in the Area of Specialization and the Liberal Learning Seminars has been completed. In this work, the student is guided and later assessed by the SNL Faculty Mentor, a Professional Advisor from CTI, and an outside assessor who has experience specific to the student's area of practice.

ARTS IN INFORMATION TECHNOLOGY

This broad program is intended for those in sales, management, marketing, and other professions who need to interact closely with IT specialists and technicians without being an IT specialist or technician. The program also is suited for managers of IT staff. For example, a large telecommunications company may have a non-technical sales manager for a technical sales force whose customers are also technically oriented. The goal of the MA in Information Technology program is to prepare someone like the non-technical sales manager to interact effectively with the technical sales force and the technical customers.

Students who complete the program will acquire an understanding of and experience with:

- The concepts, tools, and practices of information technology management.
 - The analysis phase of the software development life cycle.
 - The tools for automating information technology management and software development management.
 - The fundamentals of networks for voice and data communications and for the integration of voice and data streams.
 - The theoretical challenges and key technologies associated with distributed software systems such as email systems and the Web.
 - The methods and problems associated with technology-triggered business transformation.
 - The basics of database design and programming.
 - Strategies for the design and implementation of Internet commerce systems.
 - Techniques of systems analysis and design using object-oriented modeling.
 - The fundamentals of project management for software systems.
-
- **Prerequisite Phase**
 - **Core Knowledge Phase**
 - **Advanced Phase**

Prerequisite Phase

The courses in the Prerequisite Phase for the MA in Information Technology are:

CSC 211 Programming in Java I

CSC 212 Programming in Java II

CSC 323 Data Analysis and Statistical Software

ECT 250 Introduction to E-Commerce Technology

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit a Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The form must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Core Knowledge Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 and a designation of *distinction* on the core examinations will graduate with distinction.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Information Technology are:

IS 421 Information Systems Analysis
IS 483 Information Services and Operations
CSC 449 Database Technologies

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

Advanced Phase

The advanced phase provides breadth and depth in six areas, and allows for specialized interests through four elective courses.

Required Advanced Phase Courses:

TDC 425	Voice/Data Network Fundamentals
DS 425	Distributed Systems Fundamentals
IS 450	Enterprise Systems Implementation
ECT 435	Survey of E-Commerce Strategies and Technology
SE 430	Object-Oriented Modeling
SE 465	Software Engineering Principles

Elective Advanced Phase Courses

Four graduate-level courses from CTI MS programs. Prerequisites for such courses must be honored, of course.

COMPUTER GRAPHICS AND ANIMATION

The M.S. in Computer Graphics and Animation is a study of the technical and aesthetic foundations, design and development of Computer Graphics. This program prepares students for technical careers in the graphics industry. Several fundamental principles provide the basis for this curriculum:

- Computer graphics professionals, no matter their area of specialty, will need a solid grounding in both perception and technology.
- To be successful in the workplace, computer graphics professionals will need to be able to work well in multidisciplinary environments.
- To inculcate the flexibility required to adapt to rapid changes in technology and industry norms, students will need to be well versed in the foundations of the discipline.
- Practical experience must be coupled with theory to prepare students for the workplace.

The degree has five components:

- **Prerequisite Phase**
- **Fundamental Phase**
- **Core Phase**
- **Advanced Phase**
- **Electives**

In this program, students will:

- Develop a sensitivity to human perception, including a comprehension of fundamental design concepts, color theory, and the interaction of light with surfaces;
- Build a deep understanding of such technical concepts as interaction design, modeling objects, controlling cameras, rigging characters for animation and using particle and surface techniques;
- Learn to apply perceptual and technical abilities in creating shaders, textures, characters, scenes and animations;
- Acquire hands-on experience with a wide range of commercially-available tools;
- Develop a grasp of fundamentals that allow implementations beyond the extant user interfaces; and
- Become appreciative of the two “cultures” of computer graphics – the one drawing on communication design and the other deriving from computer science.
- The degree program offers two concentrations: a Technical Director concentration and a Developer concentration. While both concentrations have a balance of technical and aesthetic, the Technical Director will have a greater emphasis on the aesthetic while the Developer concentration will focus on the technical. After graduation, Technical Directors will be ready for jobs assisting Creative Directors in such activities as creating virtual sets, adjusting lighting and rigging characters for animation. Developers will learn technologies for graphics systems development, including game engines and plug-ins.

The M.S. in Computer Graphics program consists of 13 courses with six or seven prerequisite courses. Students choosing the Technical Director concentration take six courses while students taking the Developer concentration take seven courses.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA.

Prerequisite Phase

The courses in the Prerequisite Phase for the MS in Computer Graphics and Animation are:

GPH 212 Perceptual Principles in Digital Environments II
CSC 211 Programming in Java I
CSC 212 Programming in Java II
CSC 319 Database Technology
HCI 402 Foundations of Digital Design

For the Technical Directors concentration
GPH 259 Design Geometry

For the Developers concentration
MAT 150 Calculus I
CSC 309 C++ for Programmers

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Foundation Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Fundamental Phase

The courses in the Fundamental Phase for the MS in Computer Graphics and Animation are:

HCI 470 Digital Page Formatting I
GPH 470 Computer Graphics Survey
GPH 438 Computer Animation Survey

Core Phase

The Core Knowledge Phase courses for the MS in Computer Graphics and Animation are:

GPH 448 Computer Graphics Scripting

One of the following concentrations:

Technical Directors concentration
HCI 471 Digital Page Formatting II
HCI 422 Multimedia
GPH 560 Modeling Spaces

Developers concentration
GPH 436 Foundations of Computer Graphics (formerly CSC 436)
GPH 469 Computer Graphics Development (formerly CSC 469)
GPH 572 Principles of Animation (formerly CSC 572)

Advanced Phase

The Advanced Phase courses for the MS in Computer Graphics and Animation are:

GPH 539 Advanced Rendering Techniques (formerly CSC 539)
GPH 570 Visualization Development (formerly CSC 570)
GPH 575 Advanced Graphics Development

Elective Courses

Students in this program will have 3 electives to be chosen from the following list
GPH 436 Foundations of Computer Graphics (if not taken in the core)

GPH 572 Principles of Animation (if not taken in the core)
GPH 469 Computer Graphics Development (if not taken in the core)
GPH 536 Smooth Surface Modeling for Graphics and Animation
GPH 560 Modeling Spaces (if not taken in the core)
GPH 574 Games Development
GPH 595 Topics in Graphics
HCI 422 Multimedia (if not taken in the core)
HCI 423 Internet Multimedia
HCI 440 Introduction to Human-Computer Interaction
HCI 450 Usability in Computing Systems
HCI 460 Evaluating Human-Computer Interaction
HCI 471 Digital Page Formatting II (if not taken in the core)
HCI 512 Designing for Visualization

COMPUTER SCIENCE

The Master of Science in Computer Science is the most technical of CTI's master's programs. The courses in the Prerequisite Phase and Core Knowledge Phase focus on the foundations and fundamentals of programming languages, and the theoretical underpinnings of computer science. As part of the Advanced Phase, students get a breadth of training in traditional areas of computer science by taking one course each in Foundations, Computer Systems, and Database Systems. The remainder of the Advanced Phase gives students a great deal of flexibility. A student may choose to focus in a specific area by taking many courses in one area of computer science or from one of the other degree programs in CTI. Or, they may achieve a breadth of knowledge across many areas by selecting courses from a variety of areas. This degree is appropriate for students who wish to pursue a technical career in any of a number of areas of computer science, or for students who may wish to pursue a Ph.D. degree in the future.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- Prerequisite Phase
- Core Knowledge Phase
- Advanced Phase
-

Upon acceptance into the masters degree program, the student will meet with their faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent masters background. While completing this phase, a student is considered a conditionally admitted masters student. In the Core Knowledge phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within their chosen degree. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 or higher and a designation of distinction on at least two core examinations and no failed core examination will graduate with distinction.

Prerequisite Phase

The courses in the Prerequisite Phase for the MS in Computer Science are:

CSC 211 Programming in Java I
and CSC 212 Programming in Java II
or CSC 224 Java for Programmers*
CSC 309 Object-Oriented Programming in C++
CSC 343 Introduction to Operating Systems
CSC 345 Computer Architecture
CSC 415 Foundations of Computer Science I
CSC 416 Foundations of Computer Science II

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be

waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Computer Science are:

CSC 447 Concepts of Programming Languages
CSC 491 Design and Analysis of Algorithms
SE 450 Object-Oriented Software Development Methods

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are; Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

Advanced Phase

One course in each of the following areas: Foundations, Computer Systems, Database Systems
Four additional courses from the areas above or Artificial Intelligence, Computer Vision, Data Analysis, Computer Graphics, Software Engineering, Security, Network Technologies, two of which must be 500-level. Courses are grouped into different areas below for your convenience. A student may concentrate in one area by taking all 4 courses from the same area, or may wish to take courses from a variety of areas.

Three elective courses. Students must choose three graduate level elective courses from the School of CTI. Elective courses are in the range of 420-699.
Overall, at least four 500-level courses.

There is a research option for this degree as well.

Database Systems Area

CSC 449 Database Technologies
CSC 451 Database Design
CSC 452 Database Programming
CSC 454 Database Administration and Management
CSC 549 Database System Implementation
CSC 550 Object-Oriented Databases
CSC 551 Distributed Database Systems
CSC 553 Advanced Database Concepts
CSC 589 Topics in Databases
DS 575 Intelligent Information Retrieval

Foundations Area

CSC 444 Automata Theory and Formal Grammars
CSC 448 Compiler Design

CSC 503 Parallel Algorithms
CSC 504 Parallel Processing
CSC 535 Formal Semantics of Programming Languages
CSC 544 Theory of Computation
CSC 547 Advanced Topics in Programming Languages
CSC 548 Advanced Compiler Design
CSC 599 Topics in Computer Science
DS 591 Distributed Algorithms
SE 580 Design of Object-Oriented Languages
SE 590 Advanced Topics in Object-Oriented Technology

Computer Systems Area

CSC 545 Advanced Computer Organization
CSC 546 Operating Systems Design
DS 420 Foundations of Distributed Systems I
DS 421 Foundations of Distributed Systems II
DS 513 Client/Server Technologies
DS 520 Distributed Systems Frameworks
DS 594 Distributed Systems Project
DS 599 Topics in Distributed Systems
SE 540 Software Development for Mobile and Wireless Systems
SE 542 Software Development for Limited and Embedded Systems
SE 550 Distributed Software Development
SE 552 Concurrent Software Development
TDC 561 Network Programming

Artificial Intelligence Area

CSC 457 Expert Systems
CSC 458 Symbolic Programming
CSC 480 Foundations of Artificial Intelligence
CSC 578 Neural Networks and Machine Learning
CSC 587 Cognitive Science
CSC 594 Topics in Artificial Intelligence
DS 575 Intelligent Information Retrieval

Computer Vision Area

CSC 481 Introduction to Image Processing
CSC 498 Digital Signal Processing
CSC 538 Vision Systems
CSC 581 Applied Image Analysis
CSC 584 Computer Vision
CSC 592 Topics in Computer Vision and Pattern Recognition

Data Analysis Area

CSC 423 Data Analysis and Regression
CSC 424 Advanced Data Analysis
CSC 428 Data Analysis for Experimenters
CSC 521 Monte Carlo Simulations: Algorithms and Applications
CSC 578 Neural Networks and Machine Learning
CSC 598 Topics in Data Analysis
ECT 584 Web Data Mining for Business Intelligence
SE 468 Software Measurement
SE 567 Software Reliability

Computer Graphics Area

GPH 436 Fundamentals of Computer Graphics
GPH 438 Survey of Computer Animation
GPH 448 Computer Graphics Scripting
GPH 469 Computer Graphics I
GPH 470 Survey of Computer Graphics
GPH 536 Smooth Surface Modeling for Graphics and Animation

GPH 539 Advanced Rendering Techniques
GPH 560 Modeling Spaces
GPH 570 Visualization
GPH 572 Principles of Animation
GPH 574 Computer Games
GPH 575 Advanced Graphic Development
GPH 595 Topics in Graphics

Software Engineering Area

SE 427 Software Quality Management
SE 430 Object-Oriented Modeling
SE 431 Formal Software Specification and Development I
SE 433 Software Testing
SE 452 Object-Oriented Enterprise Application Development
SE 465 Software Engineering Principles
SE 468 Software Measurement and Project Estimation
SE 469 Software Safety
SE 470 Software Engineering Processes
SE 472 Personal Software Process
SE 477 Software and System Project Management
SE 480 Software Architecture
SE 482 Requirements Engineering
SE 529 Software Risk Management
SE 531 Formal Software Specification and Development II
SE 533 Software Validation and Verification
SE 546 Software Architecture and Design for Desktop Applications
SE 554 Enterprise Component Architecture
SE 558 Software Methodologies
SE 560 Structured Document Interchange and Processing
SE 571 Software Maintenance

Security Area

CSC 440 Cryptology
DS 420 Foundations of Distributed Systems I
DS 421 Foundations of Distributed Systems II
ECT 582 Secure Electronic Commerce
IS 511 Social Issues of Computing
IS 572 Information Security Management
SE 473 Security Architecture I
SE 547 Foundations of Security
SE 573 Security Architecture II
TDC 511 Telecommunications Practicum
TDC 562 Computer-Communication Network Design & Analysis
TDC 563 Protocols for Data Networks
TDC 572 Network Security

Network Technologies Area

TDC 432 Computer and Information Systems Modeling
TDC 460 Foundations of Communications Systems
TDC 463 Computer Networks and Data Systems
TDC 464 Voice Communication Networks
TDC 489 Queuing Theory with Computer Applications
TDC 511 Telecommunications Practicum
TDC 512 Cellular and Wireless Telecom
TDC 513 Client/Server Technologies
TDC 514 Computer Telephony
TDC 561 Network Programming
TDC 562 Computer Communications 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
TDC 572 Network Security
TDC 573 Multimedia Networking

Masters Research Option

Students interested in a more in-depth study of a particular area can choose to work with a faculty member (not necessarily their academic advisor) on a research project. This option can be satisfied by taking the course CSC 696 (Masters Project) at least twice, each time for 4 credits. The Masters research option will replace one elective and one of the 4 required area courses. Students who choose this option must successfully complete the core exams prior to their first enrollment in CSC 696. The research project must represent an original contribution to the area, and may include system development, empirical studies, or theoretical work. The scope and the details of the research project will be determined by the research supervisor, and must be approved by the student's academic advisor. At the end of the two quarters, the student must submit a technical report detailing the results of the research project. This report must be approved by the student's research supervisor and the faculty advisor, at which point it will be made available to the public as a CTI Departmental Technical Report.

COMPUTER, INFORMATION AND NETWORK SECURITY

The Master of Science in Computer, Information and Network Security is intended for those students who wish to specialize in the security aspects of the Information Technology (IT) field. It is suited for students who wish to pursue work in a security related field. Students who complete the program will be prepared to

- Assess the information security risks faced by an organization;
- Understand technology and human factors related to these risks;
- Evaluate tools and resources currently available to limit risk, mitigate the effects of hostile action and recover from attack;
- Manage the development, implementation and evolution of a security infrastructure;
- Assess the impact of policy, legislation and market trends on organizational security objectives;
- Design, implement and maintain software systems designed to support security policy and goals;
- Develop and maintain a network architecture consistent with mitigating risk and preventing hostile attack; and
- Be lifelong learners in the information security environment.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Core Knowledge Phase**
- **Advanced Phase**

Upon acceptance into the master's degree program, the student will meet with their faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Core Knowledge phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within their chosen degree. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses. GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 or higher and a designation of distinction on at least two core examinations and no failed core examination will graduate with distinction.

Prerequisite Phase

The courses in the Prerequisite Phase for the MS in Computer, Information and Network Security are:

CSC 211 Programming in Java I
CSC 212 Programming in Java II
or CSC 224 Java for Programmers*
CSC 309 Object-Oriented Programming in C++
CSC 343 Introduction to Operating Systems
CSC 415 Foundations of Computer Science I
CSC 416 Foundations of Computer Science II
CSC 390 Fundamentals of Information Assurance

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Computer, Information and Network Security are:

DS 420 Foundations of Distributed Computing
SE 450 Object Oriented Development
TDC 463 Computer Networks

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are; Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

Advanced Phase

A student must complete 40 credits (10 courses) in the Advanced Phase to earn the MS in Computer, Information and Network Security. Students in the Core Knowledge Phase may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

Students must complete the following four courses:

IS 511 Social Issues of Computing
IS 572 Information Security Management
SE 473 Security Architecture I
TDC 572 Network Security

Choose 3 from the following list:

CSC 440 Cryptology
DS 421 Foundations of Distributed Systems II
ECT 582 Secure Electronic Commerce
SE 547 Foundations of Security
SE 573 Security Architecture II
TDC 511 Telecommunications Practicum
TDC 562 Computer-Communication Network Design & Analysis
TDC 563 Protocols for Data Networks
Two elective courses must also be completed. See elective course restrictions below.

Capstone

The capstone class provides an opportunity for students to demonstrate and assess the skills they have developed during the rest of the degree.

Students should either take one of:

CNS 594 Computer, Information and Network Security Capstone
or CSC 698, ECT 698, IS 698, SE 698, TDC 698

Masters Thesis

Elective Course Restrictions

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

DISTRIBUTED SYSTEMS

The Distributed Systems degree is a synthesis of the traditional disciplines of Computer Science, Software Engineering, and Telecommunications with modern technologies that incorporate the use of distributed platforms in their application. The core phase includes software development in languages such as Java, the study of frameworks such as J2EE, .Net, and CORBA, and the use of traditional network routing and protocols. In the Advanced Phase, students study network and concurrent programming, databases, distributed algorithms, and distributed software, using these to develop sophisticated applications. Graduates of this program will be prepared to lead innovation in the new wave of Intranet, Internet, and Web-based applications.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Core Phase**
- **Advanced Phase**

Upon acceptance into the master's degree program, the student will meet with their faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Core Knowledge phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within their chosen degree. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 or higher and a designation of distinction on at least two core examinations and no failed core examination will graduate with distinction.

Prerequisite Phase

The courses in the Prerequisite Phase for the MS in Distributed Systems are:

CSC 211 Programming in Java I

CSC 212 Programming in Java II

or CSC 224 Java for Programmers

CSC 309 Object-Oriented Programming in C++

CSC 343 Introduction to Operating Systems

CSC 323 Data Analysis and Statistical Software I

CSC 415 Foundations of Computer Science I

CSC 416 Foundations of Computer Science II

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with

practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Distributed Systems are:

DS 420 Foundations of Distributed Systems I
DS 421 Foundations of Distributed Systems II
SE 450 Object-Oriented Software Development

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are; Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

Advanced Phase

A student must complete 40 credits (10 courses) in the Advanced Phase to earn the MS in Distributed Systems. Students in the Core Knowledge Phase may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination. Students must complete the following five courses:

CSC 449 Database Technologies
CSC 491 Design and Analysis of Algorithms
SE 452 Component-Based Enterprise Computing
SE 550 Distributed Software Development
TDC 561 Network Programming

Students must also complete three classes chosen from the following list:

CSC 480 Foundations of Artificial Intelligence
CSC 503 Parallel Algorithms
CSC 546 Operating Systems Design
CSC 549 Advanced Database Systems
CSC 551 Distributed Database Systems
CSC 580 Artificial Intelligence Programming
DS 513 Client/Server Technologies
DS 520 Distributed Systems Frameworks
DS 575 Intelligent Information Retrieval
DS 591 Distributed Algorithms
DS 599 Topics in Distributed Systems
SE 533 Software Validation and Verification
SE 552 Concurrent Software Development
SE 554 Enterprise Component Architecture
SE 560 Structured Document Interchange and Processing
SE 570 Design and Architecture of Secure Software Systems
TDC 562 Computer-Communication Network Design and Analysis
TDC 568 Network Management

Elective Courses

Two elective courses must also be completed. See elective course restrictions below.

Elective Courses

Elective

Course

Restrictions:

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

Master's Research Option:

Two terms of DS 599 may be taken as a research project under faculty supervision. The two DS 599 courses replace (a) one open elective and (b) one advanced phase requirement.

E-COMMERCE TECHNOLOGY

The Master of Science in E-Commerce Technology is directed toward those who want to work in the rapidly expanding field of e-commerce application development. With the explosive growth of the Internet, industries are increasingly employing Internet and related E-Commerce technologies for such applications as Web-based retailing, electronic supply chain management, and Web publishing. In addition, Intranets provide a cost-effective approach to both intra-organizational data sharing and facilitation of collaborative work process. Reflecting the eclectic nature of current Web development, the MS in E-Commerce Technology exposes students to a broad and ever-changing mix of technologies, programming languages and tools. Practicums, team projects, and work for real clients provide an authentic environment for learning. Students who have earned the MS in E-Commerce Technology will have the skills and knowledge necessary to lead e-commerce application development in large organizations or consulting firms, or establish their own consulting practices in this rapidly growing field.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Foundation Phase**
- **Advanced Phase**

Upon acceptance into the master's degree program, the student will meet with a faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Foundation Phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical Foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within the chosen degree. This phase adds depth to the work completed in the Foundation Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 will graduate with distinction.

Prerequisite Phase

The courses in the Prerequisite Phase for the Master of E-Commerce Technology are:

CSC 211 Programming in Java I

CSC 212 Programming in Java II

or CSC 224 Java for Programmers*

ECT 270 Client Side Web Application Development

IS 315 Analysis and Design Techniques

ECT 353 Server Side Web Application Development

CSC 415 Foundations of Computer Science I

CSC 416 Foundations of Computer Science II

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Foundation Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Foundation Phase

CSC 449 Database Technologies

DS 425 Distributed Systems Fundamentals

or DS 420 Foundations of Distributed Systems

ECT 455 Design and Strategies for Internet Commerce (formerly ECT 555)

ECT 480 Intranets and Portals (formerly ECT 580)

ECT 481 Internet Supply Chain Management (formerly ECT 581)

Advanced Phase

Required

ECT 441 Usability Issues for Electronic Commerce

ECT 582 Secure Electronic Commerce

ECT 588 E-Marketplace Modeling Technology

Capstone (1 course, no substitution)

ECT 589 E-business management (capstone)

ECT 590 E-business technology practicum

Advanced Electives

4 courses (at least two 500-level courses) the following are recommended

CSC 451 Database Design

CSC 452 Database Programming

CSC 549 Database System Implementation

CSC 550 Object-oriented database

CSC 551 Distributed database

ECT 423 Internet Multimedia

ECT 556 E-business enterprise architecture design

ECT 557 Peer-to-peer technologies

ECT 583 Advanced Scripting Technologies

ECT 584 Web Data Mining for Business Intelligence

ECT 585 Legal Aspects of E Commerce

ECT 586 Customer Relationship Management Techniques

ECT 587 Mobile Commerce Technology

ECT 690 Research Seminar

ECT 696 Master's Project

ECT 698 Master's Thesis

HCI 460 Evaluating Human-Computer Interaction

HCI 540 User Interface Implementation

IS 450 Technological Organizational Transformation

IS 512 Groupware and Virtual Collaboration

IS 556 Project Management

IS 560 Enterprise Resource Planning

DS 513 Client/Server Technologies

DS 520 Distributed Systems Frameworks

TDC 463 Computer Networks and Data Systems

SE 430 Object-Oriented Modeling

SE 452 Object Oriented Enterprise Application Development

SE 465 Software Engineering Principles

SE 560 Structured document interchange and processing

Elective Course Restrictions

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

HUMAN COMPUTER INTERACTION

The Human-Computer Interaction (HCI) master's degree program focuses on the rapidly growing discipline called Human-Computer Interaction. HCI practitioners are involved in the design, implementation, and evaluation of computer interfaces that are accessible and easy for people to use. This degree integrates courses in computer science, graphic design, psychology, and Human-Computer Interaction to provide a broad understanding of the discipline. The program has five phases, with each phase preparing the student for the subsequent phase.

The master's degree program consists of:

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

Upon acceptance into the master's degree program, the student will meet with a faculty advisor to discuss Prerequisite courses. The Prerequisite courses are intended to ensure that all students enter graduate courses with an equivalent background. The Fundamental courses offer knowledge in the multiple disciplines that contribute to HCI. Students in the Core courses acquire an understanding of the technological and theoretical foundations, and the Advanced Phase provides students the opportunity to study specialized topics in greater depth. This phase adds depth to the work completed in the previous phases. The degree culminates in the experience of the Capstone Course where students take a real-life problem from design through implementation and usability testing.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA.

Prerequisite Courses

The courses in the Prerequisite Phase for the MS in Human-Computer Interaction are:

CSC 211 Programming in Java I

CSC 212 Programming in Java II

or CSC 319 Database Technology

CSC 323 Data Analysis and Statistical Software I

HCI 332 User-Centered Web Development

CSC 336 Visual Basic for Programmers

HCI 402 Foundations of Digital Design

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Fundamentals Courses

Students should complete their Prerequisite courses before beginning the Fundamental courses. However, while completing the Prerequisite courses, students may take Fundamental courses with consent of their faculty advisor. The Fundamental courses for the MS in Human-Computer Interaction are:

HCI 440 Introduction to Human-Computer Interaction

HCI 470 Digital Page Formatting I

Core Courses

Students must complete all Prerequisite courses and should complete all Fundamental courses before taking Core courses. The Core courses are:

HCI 430 Prototyping for Human-Computer Interaction I

HCI 445 Design and Analysis for HCI

HCI 450 Usability in Computer Systems

HCI 460 Evaluating Human-Computer Interaction

HCI 471 Digital Page Formatting II

Advanced Phase Courses

Students must complete five of the following 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 513 Design and Strategies for Internet Commerce

HCI 560 Information Technology Training and User Support

HCI 590 Topics in Human-Computer Interaction

IS 450 Technological Organizational Transformation

Computer Science

SE 430 Object-Oriented Modeling

CSC 449 Database Technologies

GPH 469 Computer Graphics I

GPH 470 Survey of Computer Graphics

GPH 539 Advanced Rendering Techniques

GPH 570 Visualization

ECT 433 Survey of Web Programming Technologies

HCI 432 User Centered Interactive Web Development

HCI 530 Usability Issues for Handheld Devices

HCI 540 User Interface Implementation I

Evaluation

CSC 423 Data Analysis and Regression

CSC 424 Advanced Data Analysis

CSC 428 Data Analysis for Experimenters

CSC 587 Cognitive Science

PSY 402 Perceptual Processes

PSY 404 Learning and Cognitive Processes

PSY 645 Organization Development

PSY 646 Needs Analysis

PSY 647 Organizational Consulting: Diagnosis

PSY 649 Testing: Measurement, Application and Legal Considerations

PSY 650 Creativity and Decision Making

Capstone Course

HCI 594 Human-Computer Interaction Capstone

INFORMATION SYSTEMS

The master's degree program in Information Systems provides advanced training in systems development methodology and the use of information technology in enabling organizational transformation and competitive strategies. Students in this program will become conversant in both new technologies and business strategies. Future career possibilities include systems analysts, project leaders, IT consultants, and information resource managers, who can integrate people, process, and organization to provide creative information technology solutions.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Core Knowledge Phase**
- **Advanced Phase**

Concentration options:

- Standard Program
- E-Commerce Technology Concentration
- Systems Development Concentration
- Databases and Data Mining Concentration
- IT Project Management Concentration
- Collaborative Technologies Concentration
- Networking Concentration

Upon acceptance into the master's degree program, the student will meet with a faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Core Knowledge Phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within their chosen degree either in the standard program or in one of the IS concentrations. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 or higher and a designation of distinction on at least two core examinations and no failed core examination will graduate with distinction.

Prerequisite Phase

The courses in the Prerequisite Phase for the MS in Information Systems are:

- CSC 211 Programming in Java I
and CSC 212 Programming in Java II
or CSC 224 Java for Programmers*
- CSC 323 Data Analysis and Statistical Software I
- CSC 336 Visual Basic for Programmers
or ECT 270 Client Side Web Application Development

ECT 353 Server Side Web Application Development

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224. By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Core Knowledge Courses

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Information Systems are:

IS 421 Information Systems Analysis

IS 422 Information Systems Design

IS 483 Information Services and Operations

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are; Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

Advanced Phase

The Advanced Phase consists of ten courses. The student can elect the standard program or one of the IS concentrations during the advanced phase. The standard program provides students flexibility to experience a wide range of coursework. The student may also choose one of six concentrations for course work during the Advanced Phase.

Standard Program

This option provides the greatest flexibility for course selection. In this program, the students must complete the following three required courses, and take IS 577 near the end of their studies.

CSC 449 Database Technologies

TDC 425 Voice Data Network Fundamentals

IS 577 Information Systems Capstone

Students must also complete **three of the following courses:**

IS 450 Enterprise Systems Implementation

IS 511 Social Issues of Computing

IS 512 Groupware and Virtual Collaboration

IS 540 Global Information Systems

IS 549 Data Warehousing and Data Mining

IS 553 Advanced Topics for System Development

IS 556 Project Management

IS 560 Enterprise Systems

IS 574 Decision Support and Intelligent Systems

IS 578 Information Technology Consulting
IS 596 Topics in Information Systems
ECT 455 Design and Strategies for Internet Commerce
SE 430 Object-Oriented Modeling
CSC 457 Expert Systems
TDC 572 Network Security
IS 690 Research Seminar
IS 696 Master's Project
IS 698 Master's Thesis

Students must also choose two courses from one of the following areas in consultation with their faculty advisor:

Communications
Computer Vision/Graphics
Database Systems
Distributed Systems
E Commerce Technology
Human-Computer Interaction
Software Engineering

Two elective courses must also be completed (CTI courses in the range of 420-699)

Information System Concentrations

- E-Commerce Technology Concentration
- Systems Development Concentration
- Databases and Data Mining Concentration
- IT Project Management Concentration
- Collaborative Technologies Concentration
- Networking Concentration

E-Commerce Technology Concentration

Students will acquire a broad set of skills in developing E-Commerce technological solutions that supports consumer-oriented online retailing, intranets, and extranets. All these courses provide knowledge in business strategies and hands-on development experiences in different tools and technologies. Additional skills in database, interface design, networking, and E-Commerce team management will prepare students to lead firms' e-commerce strategy and application development. A separate M.S. degree program in E-Commerce Technology is also available.

CSC 449 Database Technologies
TDC 425 Voice/Data Network Essentials
DS 425 Distributed Systems Fundamentals
ECT 455 Design and Strategies for Internet Commerce
ECT 480 Intranets and Business Intelligence
ECT 481 Intranet Supply Chain Management
ECT 441 Interface Issues for E-Commerce
ECT 589 E-Commerce Management

Two elective courses must also be completed. See elective course restrictions below.

Systems Development Concentration

Systems developers are using new tools and methods in developing applications. Object oriented modeling, workflow and organization modeling, process modeling, and data modeling, CASE technology, are part of the tools and techniques for modern systems development. Developers also need to be conversant in project management, Internet applications, and networked enterprise management skills in order to fulfill the dual roles of new application developer and system integrator.

IS 553 Advanced Topics for System Development
IS 556 Project Management
SE 430 Object Oriented Modeling
CSC 449 Database Technologies
TDC 425 Voice/Data Network Fundamentals

ECT 455 Design and Strategies for Internet Commerce
IS 577 Information Systems Capstone

Three elective courses must also be completed. See elective course restrictions below.

Databases and Data Mining Concentration

This concentration prepares students in the areas of design and implementation of databases and the management of data for knowledge discovery purposes. Students will acquire a broad set of skills in developing database applications, consolidating data from many sources, and analyzing data using a variety of sophisticated tools and techniques. From a business perspective, the goal of data mining and data warehousing is to gain strategic insights from databases by identifying relationships and trends that are not otherwise apparent. Information System professionals who understand how to use databases in business applications, who are capable of applying data warehousing concepts effectively, who have broad knowledge and familiarity with data mining tools, and who are capable of designing decision support systems are in demand to fill positions as database designers, as well as data mining and data warehousing analysts. Such positions frequently occur in business environments, as well as social and governmental agencies

CSC 449 Database Technologies
CSC 451 Database Design
CSC 452 Database programming
CSC 423 Data Analysis and Regression
ECT 584 Web Data Mining for Business Intelligence
or ECT 480 Advanced Web Information Systems
IS 567 Knowledge Discovery Technologies
IS 577 Information Systems Capstone

Three elective courses must also be completed. See elective course restrictions below.

IT Project Management Concentration

IT project managers are experienced systems analysts who have in-depth knowledge of business practices, system development methodologies, project risk management and project control mechanisms, and a broad range of current technologies. As team leaders, project managers must understand organizational dynamics, and be skilled in dealing with users, vendors, consulting firms, and internal management. Since the systems they install are often the catalysts for major organizational change, project managers must understand the process of managing technologically triggered change within organizations.

IS 450 Enterprise Systems Implementation
IS 556 Project Management
IS 560 Enterprise Systems
or IS 578 Information Technology Consulting
CSC 449 Database Technologies
TDC 425 Voice/ Data Network Essentials
ECT 455 Design and Strategies for Internet Commerce
IS 577 Information Systems Capstone

Three elective courses must also be completed. See elective course restrictions below.

Collaborative Technologies Concentration

This concentration prepares students for the management of virtual teams and the management of technology that supports virtual teams, analysis and design of virtual systems, and using collaboration technologies to undertake organizational or systems development projects. Students with this skill set may work as analysts and designers for virtual work process environments, as BPR and CRM change agents with firms who use collaborative technology to support the change process, and as consultant for firms who employ virtual work or virtual teaming environments.

IS 450 Enterprise Systems Implementation
IS 512 Groupware and Virtual Collaboration
IS 574 Decision Support and Intelligent Systems
IS 596 Topics in Information Systems

or IS 540 Global Information Technology
CSC 449 Database Technologies
TDC 425 Voice and Data Network Fundamentals
IS 577 Information Systems Capstone

Three elective courses must also be completed. See elective course restrictions below.

Networking Concentration

This concentration prepares students interested in an IS career with a focus on networked information systems. The combination of courses will provide the student with both solid IS management skills as well as technical hands-on TDC experience. Students are prepared to work for organizations that are heavily networked and require business or systems analysts who are deeply conversant in network technologies or to manage IS shops where a large component of the IS technology is network technology.

TDC 461 Basic Communication systems
TDC 463 Computer Networks and Data Systems
TDC 564 Local Area Networks
TDC 511 Telecommunications Practicum
TDC 567 Telecommunication Systems Design and Management
ECT 455 Design and Strategies for Internet Commerce
or IS 540 Global Information Technology
IS 577 Information Systems Capstone

Three elective courses must also be completed. See elective course restrictions below.

Elective Course Restrictions

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

INSTRUCTIONAL TECHNOLOGY SYSTEMS

This MS in Instructional Technology Systems program is intended for graduate students who plan to work with Instructional Technology Systems in two possible capacities:

Students in the Software Design in Instructional Technology Track emerge as accomplished software engineers and programmers. They will be prepared for jobs in software design and construction at Universities and at coding shops that specialize in educational software.

Students in the Systems Integration in Instructional Technology Track emerge as accomplished systems planners, systems analysts, and systems managers. They will be prepared for jobs in instructional software systems management, or as business/systems analysts at coding shops that specialize in educational software.

The MS in Instructional Technology Systems will equip the student with the core theories and skills to advance to be the CIO or CTO of an instruction delivery organization. A primary focus of the degree is to develop practitioners at corporate training and development organizations. The degree is split into two tracks, matching the two capacities listed above.

This program is guided by several curriculum principles:

- Reflecting the eclectic and developing nature of current Internet and instructional technology design, this program does not presuppose any dominant technologies or programming languages. Rather, students will be exposed to a broad mix of technologies, programming languages and tools.
- The program is designed to adapt to rapid changes in both technology and industry norms.
- The program is designed around industry needs and based upon a long-term partnership with instructional technology leaders.
- The program is designed to provide maximum opportunities for practicum and team projects.

The program has five phases, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Courses**
- **Fundamentals Courses**
- **Advanced Phase Courses**
- **Elective Courses**
- **Capstone Course**

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA.

Prerequisite Courses

The courses in the Prerequisite Phase for the MS in Instructional Technology Systems:

Both Tracks

CSC 211 Programming in Java I

CSC 212 Programming in Java II

or CSC 224 Java for Programmers

CSC 323 Data Analysis and Statistical Software I

**CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

Software Design in Instructional Technology Track
CSC 309 Object-Oriented Programming in C++
CSC 343 Introduction to Operating Systems
CSC 415 Foundations of Computer Science I
CSC 416 Foundations of Computer Science II

Systems Integration in Instructional Technology Track
CSC 319 Database Technology
CSC 390 Fundamentals of Information Assurance
IS 315 Analysis and Design Techniques
TDC 361 Basic Communication Systems

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination ((GAE) to show competency in a prerequisite. All students are blocked from enrolling in the graduate phase of the degree prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Fundamentals Courses

The courses in the Fundamental Phase for the MS in Instructional Technology Systems are:

Both Tracks

ITS 427 Information Processing Models Of Learning
ITS 431 Instructional Delivery and Course Management Systems
HCI 440 Introduction to HCI
HCI 460 Evaluating HCI
ITS 560 Instructional Technology Training and User Support

Software Design in Instructional Technology Track
DS 420 Foundation of Distributed Systems
SE 450 Object-Oriented Software Development

Systems Integration in Instructional Technology Track
ITS 440 Distance Learning Technologies
HCI 445 Analysis and Design for HCI

Advanced Phase

Software Design in Instructional Technology Track
Options: Pick Three from the list below:
ITS 440 Distance Learning Technologies
ECT 580 Intranets and Portals
TDC 460 Foundations of Communications Systems
DS 421 Foundations of Distributed Systems II
DS 520 Distributed Systems Frameworks
DS 575 Intelligent Information Retrieval
SE 452 Component-Based Enterprise Computing
SE 550 Distributed Software Development
HCI 422 Multimedia
HCI 423 Internet Multimedia
CSC 449 Database Technologies
CSC 457 Expert Systems
CSC 458 Symbolic Programming

CSC 480 Foundation of Artificial Intelligence
CSC 578 Neural Networks and Machine Learning
CSC 587 Cognitive Science
ITS 584 Artificial Intelligence in Learning Environments

Systems Integration in Instructional Technology Track

Options: Pick Three from the list below:

CSC 423 Data Analysis And Regression
CSC 424 Advanced Data Analysis
CSC 428 Data Analysis For Experimenters
ECT 433 Survey of Web Programming Technologies
ECT 580 Intranets and Portals
DS 425 Distributed Systems Fundamentals
IS 450 Technological Organizational Change
IS 511 Social Issues of Computing
IS 512 Groupware and Virtual Collaboration
IS 572 Risk Management
HCI 430 Prototyping for HCI
HCI 450 Usability in Computer Systems
HCI 422 Multimedia
HCI 423 Internet Multimedia

Elective Courses

Both Tracks

Two open electives from CTI courses numbered 420-599

Capstone Course

ITS 589 ITS Capstone Projects Course

MANAGEMENT INFORMATION SYSTEMS

The Management Information Systems degree is a joint program of the School of CTI and the College of Commerce. This program is highly specialized and is geared toward a student with undergraduate training in both computer science and business. The concentration focuses specifically on information systems used by management. The computer science courses deal with the technical aspects of database and decision support systems, basic computer technology and information systems, and foundations of computer systems. The College of Commerce courses develop topics on project and system design, project and system management and the integration of information systems.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Core Knowledge Phase**
- **Advanced Phase**

Upon acceptance into the master's degree program, the student will meet with a faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Core Knowledge Phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within the chosen degree. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Admissions, Grade and GPA requirements

Admissions: A student must be accepted to both CTI and the College of Commerce. Please see CTI's admission requirements and the College of Commerce admission requirements for specific information.

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 or higher and a designation of distinction on at least two core examinations and no failed core examination will graduate with distinction.

Prerequisite Phase

Business: See the College of Commerce for requirements

Software Development

CSC 211 Programming in Java I
and CSC 212 Programming in Java II
or CSC 224 Java for Programmers*

CSC 323 Data Analysis and Statistical Software I

CSC 336 End-User Application Development
or ECT 270 Client Side Web Application Development

ECT 353 Server Side Web Application Development

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses.

The Management Information Systems Core Knowledge Phase consists of three Computer Science courses and three Management Information Systems courses, for a total of six courses. Most students complete the courses listed below. However, students with related coursework or experience may waive some of the courses, but this requires permission of the advisor. (Waived courses are replaced with approved electives.) Students are still responsible for the content of these courses on the Core Knowledge Examination. The course requirements are:

Management Information Systems: See the College of Commerce for requirements

Computer Science

IS 421 Information Systems Analysis
IS 422 Information Systems Design
IS 483 Information Services and Operations

Core Knowledge Examination

These examinations cover the subject matter of the Core Knowledge Phase courses. Students have the option of taking one, two, or three core exams at one time after completion of the applicable course or courses. Possible grades on the Core Examinations are; Pass with Distinction, Pass, and Fail. Students are allowed at most two attempts at each exam. Two failures on one exam results in dismissal from the graduate program.

To be eligible for core exam application, a student must have completed all prerequisite courses or be registered for the final prerequisite course in the quarter before the core exam for which the student is applying. Additionally, a student must successfully complete all prerequisite courses (B- or better required) before being allowed to sit for any core exam. Failure to successfully complete a core class (grade of C- or better required) may result in an administrative cancellation of the student's core exam(s).

A grade of B- or better is required for the MIS courses in the core knowledge phase. If a student receives a C+ or lower in one of the courses, they have two options: 1) re-take the course and receive a B-, or 2) take the corresponding comprehensive exam and receive a passing grade.

Advanced Phase

The Advanced Phase consists of seven graduate level courses. Students must fulfill the course requirements in both Management Information Systems and Computer Science. Three of these courses must be selected from the Advanced Phase Management Information Systems courses, and three from the Advanced Phase Computer Science courses. The seventh course must be chosen from an MIS or a Computer Science elective (selection to be approved by the advisor). In individual cases, the student's advisor may waive some of these courses, but they must be replaced by approved electives.

Management Information Systems: See the College of Commerce for requirements

Computer Science

Students must take the following three Advanced Phase Computer Science courses:

CSC 449 Database Systems
TDC 425 Voice/Data Network Fundamentals
IS 577 Information Systems Capstone

Elective Course

1 Elective course

To be chosen from an MIS or a CTI elective (selection to be approved by an advisor)

Elective Course Restrictions:

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

SOFTWARE ENGINEERING

Software Engineering is a discipline concerned with the practical problems of developing large-scale software systems. Software engineers are the architects of the software component of a computer-based system, providing several levels of representations or blueprints leading to specifications through which programmers build the subsystems and modules of the system. Software development methodologies and management techniques combine with theories from mathematics and computer science in a cost-effective manner to solve real-world system development problems. This degree provides students with the theoretical foundations of software engineering, experience in team projects involving software development and management, hands-on experience with state-of-the-art tools, an understanding of advanced software development and management techniques, and exposure to the most recent developments and emerging technologies in SE.

All students complete any necessary prerequisite courses plus 13 graduate courses. All students are required to participate in an extensive team software development project using cutting edge technologies and the Software Engineering Research Seminar to keep them abreast of this rapidly changing field. For this reason, they are not required to take a Core Knowledge Examination. However, to be admitted into the program, they need to have demonstrated through their prior coursework that they can consistently perform at a B level or higher. Students complete the requirements of one of the three concentrations: Project Management, Software Development, or Software Systems. *Admission to the Project Management concentration requires two or more years of experience in software development or a closely related field.*

The Project Management Concentration of the Master of Science in Software Engineering addresses the management of the quality of software products and processes and provides coursework in management and measurement techniques.

The Software Development Concentration of the Master of Science in Software Engineering addresses the foundations, methodologies, and tools for developing high quality large-scale software systems, with an emphasis on the technical issues of software development.

The Software Systems Concentration of the Master of Science in Software Engineering addresses the foundations and theories in designing and developing system software and tools for programming languages and software development.

The Software Engineering program has two phases:

- **Prerequisite Phase**
- **Graduate Phase**

The Prerequisite Phase ensures that all students acquire the necessary background prior to enrolling in graduate courses. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. In the Graduate Phase, students develop as software engineering professionals by completing required courses that provide a common body of knowledge for their concentration as well as advanced courses that complement and add depth to the common body of knowledge. All students also participate in an extensive team software development project and the Software Engineering Research Seminar. Individual needs are addressed through elective courses chosen in consultation with a faculty advisor.

Prerequisite Phase

The following courses are required for all concentrations:

CSC 211 Programming in Java I
CSC 212 Programming in Java II
 or CSC 224 Java for Programmers*
CSC 415 Foundations of Computer Science I
CSC 416 Foundations of Computer Science II

*CSC 224 is equivalent to both CSC 211 and CSC 212. Only students with experience in programming languages should take CSC 224.

Also required for the Project Management Concentration and the Software Development Concentration:

CSC 309 Object-Oriented Programming in C++
or CSC 343 Introduction to Operating Systems
or CSC 345 Computer Architecture

Also required for the Software Systems Concentration

CSC 309 Object-Oriented Programming in C++
CSC 343 Introduction to Operating Systems

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Degree Requirements

Students in this degree program must complete 13 courses (52 hours) beyond the Prerequisite Phase. Successful completion of the Software Engineering Program consists of:

Completion of courses in the required phase with a grade of B or better. Students with prior coursework equivalent to any required courses may be allowed by a Software Engineering counselor to take other related advanced courses as substitutes.

Completion of advanced courses.

Students who meet the following requirements will graduate with distinction
a GPA of 3.76 or higher, and an A in SE 696 or SE 698 or distinction in the comprehensive exam.

Graduate Phase

Students may register for graduate courses only after meeting all Prerequisite Phase requirements. The graduate phase consists of the following components:

- Concentration required courses
- Software engineering studio
- Advanced Courses
- Software Development Professional Option
- Research Option

Required Courses

Software Development Concentration

SE 430 Object-Oriented Modeling
SE 431 Formal Software Specifications and Development I
SE 450 Object Oriented Software Development
SE 452 Object-Oriented Enterprise Application Development
SE 550 Distributed Software Development

Software Systems Concentration

CSC 447 Concepts of Programming Languages
CSC 491 Design and Analysis of Algorithms
SE 450 Object-Oriented Software Development
CSC 448 Compiler Design
or SE 431 Formal Software Specifications and Development I
SE 550 Distributed Software Development

Project Management Concentration
SE 430 Object-Oriented Modeling
SE 450 Object Oriented Software Development
SE 452 Object-Oriented Enterprise Application Development
SE 477 Software and Systems Project Management
SE 468 Software Measurement and Project Estimation
or SE 470 Software Engineering Processes

Software Engineering Studio
Students in all concentrations are required to complete the following:
SE 491 Software Engineering Studio
SE 591 Software Engineering Studio II

These two courses must be taken as a sequence in consecutive quarters. Students will be working on a large, real project in a team. The project will be carried out from conceptualization to completion using the current technologies.

Advanced Courses

Prior to entering the advanced phase, students must choose to either pursue the Software Development Professional option or the Research option.

Software Development Professional Option
Two courses from the following list in addition to any courses already taken in the required phase. These courses plus SE 430 and all required courses from the selected concentration must be completed prior to registering for SE 681 or SE 682.

SE 433 Software Testing
SE 468 Software Measurement and Project Estimation
SE 472 Personal Software Process
SE 477 Software and System Project Management
SE 480 Software Architecture
SE 482 Requirements Engineering

One course from the following list.
SE 529 Software Risk Management
SE 533 Software Validation and Verification
SE 540 Software Development for Mobile and Wireless Systems
SE 542 Software Development for Limited and Embedded Systems
SE 546 Software Architecture and Design for Desktop Applications
SE 550 Distributed Software Development
SE 552 Concurrent Software Development
SE 554 Enterprise Component Architecture
SE 558 Software Methodologies
SE 560 Structured Document Interchange and Processing
SE 567 Software Reliability
SE 570 Design and Architecture of Secure Software Systems
SE 571 Software Maintenance
SE 580 Design of Object-Oriented Languages
SE 590 Advanced Topics in Object-Oriented Technology

Students taking the Software Engineering Professional option must complete both of the following courses.

SE 681 Software Engineering Professional Practices
SE 682 Software Engineering Development Environments

SE681 and SE682 may be taken in either order or concurrently. Prior to graduating and following completion of both SE 681 and SE 682 students must pass a comprehensive exam covering materials from SE 430, SE 450, SE 681 and SE 682.

One elective. See elective course restrictions below.

Research Option

Two courses from the following list. One must be 500 level.

SE 420 Object-Oriented Design
SE 427 Software Quality Management
SE 431 Formal Software Specification and Development
SE 433 Software Testing
SE 450 Object-Oriented Software Development
SE 452 Object-Oriented Enterprise Application Development
SE 466 Software Engineering Projects
SE 468 Software Measurement and Project Estimation
SE 469 Software Safety
SE 470 Software Engineering Processes
SE 472 Personal Software Process
SE 473 Security Architecture I
SE 477 Software and System Project Management
SE 480 Software Architecture
SE 482 Requirements Engineering
SE 529 Software Risk Management
SE 531 Formal Software Specification and Development II
SE 533 Software Validation and Verification
SE 540 Software Development for Mobile and Wireless Systems
SE 542 Software Development for Limited and Embedded Systems
SE 546 Software Architecture and Design for Desktop Applications
SE 550 Distributed Software Development
SE 552 Concurrent Software Development
SE 554 Enterprise Component Architecture
SE 558 Software Methodologies
SE 560 Structured Document Interchange and Processing
SE 567 Software Reliability
SE 570 Design and Architecture of Secure Software Systems
SE 571 Software Maintenance
SE 573 Security Architecture II
SE 580 Design of Object-Oriented Languages
SE 590 Advanced Topics in Object-Oriented Technology

Students taking the research option must take the following course:

SE 690 Software Engineering Research Seminar

Student must also complete one of the following:

SE 696 Masters Project

SE 698 Masters Thesis

SE 698 Masters Thesis is a two-credit hour course. Students must register for this course a minimum of two times and must continue to enroll in the course in every quarter after the first quarter until the thesis is completed to the satisfaction of their advisor. A maximum of four credit hours will apply for degree credit.

The Master's project or thesis must represent an original contribution to the area, and may include system development, empirical studies, or theoretical work. The scope and the details of the research project will be determined by the research supervisor, and must be approved by the student's academic advisor.

Two electives. See elective course restrictions below.

Elective Course Restrictions

Elective courses are in the range of 420-699, not including SE 465 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

TELECOMMUNICATIONS

The MS in Telecommunications Systems offers extensive theoretical and practical knowledge in voice and data communications networks. Students completing this degree program have a thorough understanding of the technical and operational aspects of networks as well as the foundational theory of voice and data communications and network management.

The program follows a three-phase sequence, with each phase preparing the student for the subsequent phase. The master's degree program consists of:

- **Prerequisite Phase**
- **Core Knowledge Phase**
- **Advanced Phase**

Upon acceptance into the master's degree program, the student will meet with their faculty advisor to discuss required courses for the Prerequisite Phase. The Prerequisite Phase is intended to ensure that all students enter graduate courses with an equivalent background. While completing this phase, a student is considered a conditionally admitted master's student. In the Core Knowledge phase, a student will follow a sequence of courses to acquire an understanding of the technological and theoretical foundations for the particular degree. In the Advanced Phase of the program, the fundamental information learned previously allows a student to study advanced topics within their chosen degree. This phase adds depth to the work completed in the Core Knowledge Phase. Individual interests and needs are also addressed through a series of elective courses chosen in consultation with the student's faculty advisor.

Grade and GPA requirements

Grades: Students must receive a grade of B- or better in each prerequisite course and a C- or better in all other courses.

GPA: Students must maintain a graduate level GPA of 2.50 or higher while pursuing their degree. Students will not be approved for graduation with less than a 2.50 GPA. Students with a GPA of 3.75 and a designation of *distinction* on the core examinations will graduate with distinction.

Prerequisite Phase

CSC 211 Programming in Java I
or CSC 224 Java for Programmers
CSC 323 Data Analysis and Statistical Software I
CSC 415 Foundations of Computer Science I
or MAT 140 Discrete Mathematics I
TDC 361 Basic Communication Systems
TDC 311 Computers in Information Systems and Telecommunications
or CSC 343 Introduction to Operating Systems
and CSC 345 Computer Architecture

By taking these courses and receiving a grade of a B- or better in each, the student will have completed the requirements of the Prerequisite Phase. All or part of the Prerequisite Phase may be waived if a student has the equivalent academic background. Alternatively, students with practical experience may complete a Graduate Assessment Examination (GAE) to show competency in a prerequisite. All students are blocked from enrolling in Core Knowledge Phase courses prior to completing their prerequisites. The student must submit an online Change of Status request when the Prerequisite Phase is completed to inform the Student Services offices that the block can be removed. The online request must be submitted two weeks before the student intends to register for graduate level classes. The student will then be considered a fully admitted student, and may pass to the Graduate Phase of the program. Students may submit the Change of Status request by logging in to MyCTI.

Core Knowledge Phase

Fully admitted students in the Core Knowledge phase may register for a maximum of four Advanced phase courses. The Core Knowledge Phase courses for the MS in Telecommunications are:

TDC 460 Fundamentals of Communication Systems
TDC 463 Computer Networks
TDC 464 Voice Communication Networks

Core Knowledge Examination

This examination covers the subject matter of the Core Knowledge Phase courses. Possible grades on the Core Examination are Pass with Distinction, Pass, and Fail. A student is allowed at most two attempts in order to pass. Two failures on the exam results in dismissal from the graduate program.

To be eligible to apply for the core exam, a student must have completed the Core Knowledge Phase or be registered for the final core course in the quarter before the core exam for which the student is applying. Failure to successfully complete a core course (grade of C- or better required) may result in an administrative cancellation of the student's core exam.

Advanced Phase

A student must complete 40 credits (10 courses) in the Advanced Phase to earn the MS in Telecommunication Systems. All courses in the Advanced Phase must be completed with a grade of C- or better. Students in the Core Knowledge Phase may register for a maximum of four Advanced Phase courses prior to passing the Core Knowledge Examination.

TDC 511 Telecommunications Systems
TDC 567 Telecommunications System Design and Management

Five TDC courses from the range TDC 430 to TDC 599, where at least *three are numbered above 500*.

Students must also complete three open electives.

Elective Course Restrictions

Elective courses are in the range of 420-699 and must be from the school of CTI. Credit for courses taken outside of the school will only be given if approved by a faculty advisor. Courses suggested for any Prerequisite Phase in any concentration do not count for elective credit. 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.

JURIS DOCTORATE AND MASTER OF ARTS

The general objective of the joint JD/MA degree program at Law and CTI is to offer law students the opportunity to acquire technology knowledge that will support them in their work in information technology law, intellectual property law, or patent law. This joint degree accommodates JD students without a technical or scientific background who are interested in intellectual property by offering a depth of knowledge and ability to communicate in technical terms. These tools are invaluable, as future intellectual property lawyers will require at a minimum a general understanding of computer and information systems, given the prominence of cyber- and telecommunications issues in today's legal practice. The JD/MA also accommodates JD students with technical or scientific backgrounds who may be interested in a broad-based exposure to computer or information systems. Where the JD/MS degree offers students an in-depth approach to specific computer science or information systems topics, the JD/MA presents a broader view that will prepare graduates of the joint degree program to interact successfully with clients and experts in computer-related fields.

Although the JD/MA is a new degree, the program brings together concepts and ideas from some of DePaul University's strongest programs, requiring as a foundation the standard existing courses within the College of Law and a broad-based set of existing courses from CTI's current Masters Degree programs. During the students' third and fourth years of their joint-degree programs, they will pursue more advanced studies in IT while exploring complementary legal issues in intellectual property law, cyberlaw and telecommunications. At the completion of the curriculum, the student may also be eligible for a Certificate in Intellectual Property Law from the College of Law. The student may opt for a certificate in General Intellectual Property Law or a Certificate in Intellectual Property Patent Law. All degrees and certificates meet applicable American Bar Association (ABA) standards and requirements.

Characteristics of the program include:

- This joint degree is designed to provide intensive technological training to students with non-technical backgrounds who wish to pursue legal careers focused on high technology.
- Some students may wish to use the JD/MA program as a means to fulfill the technical education requirements for the patent bar exam. Such students will need to consult closely with faculty advisors in both Schools and to contact the USPTO for specific eligibility requirements.
- This program simultaneously offers a variety of curriculum options encompassing key technological topics along with legal courses which prepare the student for transactional and/or litigation work.

In this program, students will acquire:

- an in-depth understanding of the legal issues that confront present and future technologies.
- an understanding of legal principles and application of those principles to the growing number of legal issues facing technology.
- a broad exposure to current IT theory and practices including telecommunication and data communication fundamentals, database, computer and network security, B2C e-commerce technologies, object-oriented concepts, and client server architecture.
- **Prerequisite Phase**
- **Graduate Phase**
- **Culminating Thesis**

Admission Procedures and Requirements

Admission to this joint program is only open to students already matriculated in the JD program at the DePaul University College of Law. Those students must be accepted for admission to CTI *and* must be accepted for admission to the Joint Degree program. Contact the Law School for more information:

Full-time students must complete the first year of the JD with a law GPA of no less than 3.00. During that first year, they may apply for admission at CTI. They may apply for admission to the Joint Degree program when Spring Semester Law School grades are validated, normally at the end of June or early July. Part-time law students must complete three semesters of the JD program with a 3.00 GPA in law before they apply for admission to the Joint Degree program. Students accepted into the joint JD/MA Program must meet the CTI prerequisite phase course requirements for the MA degree, either through their undergraduate coursework or by adding a prerequisite phase to their joint degree program. Students who need to take prerequisite courses during their pursuit of the joint degree may require more than four years from admission to Law School to complete the Joint Degree.

Sample four-year course plan

The student must complete the regular first year JD program before being admitted to the Joint Degree. The second and third years might consist of three law courses in Fall Semester and two law courses in Spring Semester as well as one CTI course Fall Quarter, two CTI courses Winter Quarter, and two CTI courses Spring Quarter. The fourth year might consist of three law courses Fall Semester, one CTI course Fall Quarter, three CTI courses Winter Quarter, and three CTI courses Spring Quarter.

To obtain a JD in the joint degree program, the College of Law requires 76 semester hours of Law and enough CTI quarter credits to equal 10 Law semester hours. This combination adequately meets the American Bar Association (ABA) requirements to obtain a Juris Doctor. The formula to convert CTI quarter hours to Law semester hours is as follows: Divide the total number of quarter hours by 1.5. For example, 16 CTI quarter hours (approximately 5 courses) are equivalent to approximately 11 Law semester hours, thus satisfying the Law requirement stated above. This schedule allows for completion of the JD as well as completion of 14 CTI courses (the MA program plus four prerequisite courses). It is possible that, because of prerequisite coursework, the program may take some students more than four years.

Since each student would require a different number of prerequisites and each student would select courses based on semester/quarter availability, any particular curriculum might be different from the sample curriculum shown. All joint degree students will be encouraged to select courses with the assistance of Joint Degree program advisors at both the Law School and CTI.

CTI Requirements for an MA Degree

Students must show previously acquired skills or complete prerequisite courses prior to taking Graduate level coursework. Once prerequisites are completed, students will take nine Graduate level courses at CTI and then complete a capstone thesis. Because of the required prerequisites, it may take more than four years to complete the joint degree.

Prerequisite Phase

The Prerequisite Phase is intended to insure that all students enter CTI coursework with adequate preparation for successful work. Students may receive waivers for the Prerequisite Phase based on prior experience, previous coursework, or performance on a Graduate Assessment Examination (GAE). The following coursework constitutes the Prerequisite Phase:

CSC 211 Programming in Java I

CSC 212 Programming in Java II

CSC 311 Computers in Information Systems and Telecommunications

Graduate Phase

The following coursework is required in the Graduate Phase:

TDC 425 Voice and Data Network Fundamentals

DS 425 Distributed Systems Fundamentals

CSC 449 Database Technologies

ECT 433 Survey of Web Programming Technologies

SE 430 Object-Oriented Modeling

ECT 455 Design and Strategies for Internet Commerce

ECT 582 Secure Electronic Commerce

Two CTI elective courses [numbered 420-599] for which the student has completed adequate prerequisites.

Culminating Thesis

The Culminating Thesis is an independent research article that demonstrates a student's ability to integrate both technical expertise and legal knowledge. Normally, it is undertaken during the student's final year in the Joint Degree program.

In this work, the student is guided and assessed by a Committee of three faculty, at least one of whom is fulltime at CTI and at least one of whom is fulltime at the College of Law. It is the responsibility of the student to find an advisor (Committee Chair) and assemble this committee. The Masters Thesis will use the course number CSC698. It may be taken for two or four credits per quarter. 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 thesis to the satisfaction of their committee. They earn two hours of credit for each such registration but only four hours of credit will apply for degree credit.

JURIS DOCTORATE AND MASTER OF SCIENCE

The primary goal of the joint degree JD/MS program is to educate students to take advantage of the opportunities presented by the legal needs of industry in this high technology age. A critical need exists for patent attorneys in the high-tech field who have a substantive understanding of IT. Graduates of the joint degree program will be qualified for careers in intellectual property boutique law firms, in general practice firms with clients in the high technology field, as in-house counsel in the high technology industry, and in government agencies dealing with high technology regulation.

Many of the students completing the joint JD/MS degree will choose to join the Patent Bar. The technical education provided by the MS part of the program will help to qualify them for the patent bar exam. However, in today's society, members of the Patent Bar are not the only attorneys who need technological expertise for successful legal practice. Many patent litigators are not members of the patent bar, yet must become intimately familiar with the technological basis for their clients litigation positions. Trademark attorneys face infringement and prosecution issues related to domain names and Internet websites. Copyright attorneys are frequently exposed to issues of protection for computer software and Internet website content. Even lawyers who do not specialize in intellectual property law frequently face computer-related issues, as such questions arise more and more frequently in "bread-and-butter" disputes between companies immersed in high technology.

The JD/MS program is primarily aimed at students with undergraduate scientific or technical degrees or with other substantial technological or scientific background who wish to deepen their technical expertise while also obtaining a law degree.

Characteristics of the program include:

- It is designed to provide a curriculum for students with significant undergraduate technological background who wish to pursue advanced studies in Computer Science, Telecommunications, and Information Systems jointly with their legal studies.
- It offers a variety of curriculum options encompassing key technological topics along with legal courses which prepare the student for transactional and/or litigation work.
- It is expected that most students who pursue this joint degree might also obtain a Certification in Intellectual Property Patent Law from the law school.
- It is expected that most students who pursue the JD/MS degree will already be qualified to sit for the patent bar exam. Students who need to "make up" some patent bar exam requirements may be able to pursue that goal as part of this program.

In this program, students will acquire:

- an in-depth understanding of the legal issues that confront present and future technologies.
- an understanding of legal principles and application of those principles to a growing number of legal issues facing technology
- core knowledge in a particular technology discipline
- in-depth fluency with state-of-the-art technologies and IT principles.

Admission Procedures and Requirements

Admission to this joint program is only open to students already matriculating in the JD program at the DePaul University College of Law. Those students must be accepted for admission to CTI and must be accepted for admission to the Joint Degree program. For more information contact the Law School.

Full-time students must complete the first year of the JD with a law GPA of no less than 3.00. During that first year, they may apply for admission at CTI. They may apply for admission to the Joint Degree program when spring semester law school grades are validated, normally at the end

of June or early July. Part-time law students must complete three semesters of the JD program with a 3.00 GPA in law before applying for admission to the joint degree program.

Students accepted into the joint JD/MS Program must declare a specific MS degree upon application and meet the CTI prerequisite phase course requirements for that degree, either through their undergraduate coursework or by adding a prerequisite phase to their joint degree program. Students who need to take prerequisite courses during their pursuit of the joint degree may require additional more than four years from admission to law school for completion of the joint degree.

Sample four-year course plan

The student must complete the regular first year JD program before being admitted to the Joint Degree. The second and third years might consist of three law courses in Fall Semester and two law courses in Spring Semester as well as one CTI course Fall Quarter, two CTI courses Winter Quarter, and two CTI courses Spring Quarter. The fourth year might consist of three law courses Fall Semester, one CTI course Fall Quarter, three CTI courses Winter Quarter, and three CTI courses Spring Quarter.

To obtain a JD in the joint degree program, the College of Law requires 76 semester hours of Law and enough CTI quarter credits to equal 10 Law semester hours. This combination adequately meets the American Bar Association (ABA) requirements to obtain a Juris Doctor. The formula to convert CTI quarter hours to Law semester hours is as follows: Divide the total number of quarter hours by 1.5. For example, 16 CTI quarter hours (approximately 5 courses) are equivalent to approximately 11 Law semester hours, thus satisfying the law requirement stated above.

This schedule allows for completion of the JD as well as completion of 14 CTI courses (the MS program plus four prerequisite courses). It is possible that, because of prerequisite coursework, the program may take some students more than four years.

Since each student would require a different number of prerequisites and each student would select courses based on semester/quarter availability, any particular curriculum might be different from the sample curriculum shown. All joint degree students will be encouraged to select courses with the assistance of Joint Degree program advisors at both the Law School and CTI.

CTI Requirements for an MS Degree

For the CTI portion of the joint degree, students may major in:

- Computer Science
- Distributed Systems
- E-Commerce Technology
- Information Systems
- Telecommunications

Each program listed above follows the requirements as listed on its page. These requirements are divided into the Prerequisite, Core and Advanced Phases. However, upon completion of those requirements, each student will move to the Elective Phase as described below.

Electives

12 additional quarter hours fulfilled by courses from the IP Certificate course list (see Table 1) The conversion formula to convert CTI quarter hours to Law semester hours is as follows: Divide the total number of quarter hours by 1.5. Therefore, 12 CTI quarter hours is equivalent to 8 Law semester hours, or 3 Law elective courses.

- Law 250: Publicity and Moral Rights Seminar
- Law 250: Seminar: Advanced Concepts in Copyright Law
- Law 250: Seminar: Cultural Property
- Law 250: Seminar: International & Comparative Aspects of Law & the Arts
- Law 250: Seminar: International Comparative Art Law
- Law 250: Seminar: Law & the Arts
- Law 250: Seminar: Telecommunications Law
- Law 301: Intellectual Property Mini-Course (1 semester credit)
- Law 337: Biotechnology Patent Strategies for the New Millennium
- Law 338: Intellectual Property for Corporate Transactional Lawyers
- Law 339: Intellectual Property: Copyrights & Trademarks
- Law 341: Cyberlaw

Law 357: Entertainment Law
Law 404: Advanced Trademarks Practice
Law 429: Legal Clinic I: Technology & Intellectual Property
Law 447: Patent Law
Law 454: International Intellectual Property
Law 455: Advanced Legal Writing: Patents
Law 455: Advanced Legal Writing: Trademarks
Law 469: Litigation Strategy: Intellectual Property
Law 470: Advanced Patent Practice (2 semester credits)
Law 514: Legal Clinic II: Technology & Intellectual Property
Law 535: Art & the Law
Law 543: Telecommunications Law & Policy

THE VINCENTIAN CHARACTER OF DEPAUL UNIVERSITY

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.

GRADUATE ASSISTANTSHIPS

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.

