THE MASTER of SCIENCE
in
COMPUTER SCIENCE

GRADUATE PROGRAM BROCHURE
--

UNIVERSITY OF MINNESOTA DULUTH
DULUTH, MINNESOTA 55812

2012-2013

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The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363, by the Federal Civil Rights Act, 420 S.C. 2000E; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by Executive Order 11246, as amended; 38 U.S. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

University of Minnesota Graduate School Commitment to Diversity

The Graduate School embraces the University of Minnesota's position that promoting and supporting diversity among the student body is central to the academic mission of the University. We define diversity to encompass many characteristics including economic disadvantage, special talents, evidence of leadership qualities, race or ethnicity, a strong work record, and disability. A diverse student body enriches graduate education by providing a multiplicity of views and perspectives that enhance research, teaching, and the development of new knowledge. A diverse mix of students promotes respect for, and opportunities to learn from, others with the broad range of backgrounds and experiences that constitute modern society. Higher education trains the next generation of leaders of academia and society in general, and such opportunities for leadership should be accessible to all members of society. The Graduate School and its constituent graduate programs are therefore committed to providing equal access to educational opportunities through recruitment, admission, and support programs that promote diversity, foster successful academic experiences, and cultivate the leaders of the next generation.

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1. THE DEPARTMENT OF COMPUTER SCIENCE

Computer Science is a discipline that requires understanding the design of computers and computational processes. The discipline ranges from the theoretical study of algorithms to the design and implementation of software at the systems and applications levels. The Department of Computer Science offers programs leading to both the B.S. and M.S. degrees in Computer Science. The M.S. is a two-year program that depends upon a solid foundation in mathematics and statistics, computational problem solving, software design and analysis, programming languages, algorithms, data structures, and computer organization and architecture. The Master's program builds upon this foundation to provide depth in specified areas of computer science, with a focus on research and research methods. It provides the necessary foundational studies for graduates planning to pursue either a Ph.D. in computer science or a career as a computer scientist in business or industry.

The department currently consists of eleven full-time faculty members with Ph.D.s in computer science or a closely related field. On an annual basis, the department confers approximately forty bachelor's degrees. The Master's program, begun in 1987, graduates approximately twenty students per year.

The Computer Science Department is part of the Swenson College of Science and Engineering at the University of Minnesota Duluth, a campus of the University of Minnesota system. The University provides a comprehensive set of high quality programs in the areas of undergraduate, graduate and professional education to a population of some 11,000 students. Duluth is located on the shores of Lake Superior in one of the most beautiful areas of the country. The metropolitan area, with a population of approximately 100,000, offers many cultural events and excellent educational, recreational, and medical facilities.

The faculty is committed to excellence in both teaching and research. Research is focused in the following areas:

Computer Graphics
Information Retrieval
Neural Networks & Fuzzy Sets
Computer Security
User Interface Design
Logic Programming
Operating Systems
Image Processing
Virtual Environments
Applied Perception in Graphics And Visualization
Computational Linguistics
Reinforcement Learning
Artificial Intelligence
Parallel/Distributed Computing
Machine Learning
Software Engineering
Data Mining
Automated Planning
Computer Networks
Network Traffic/Performance/Quality
Real-time Systems
Knowledge Representation
Natural Language Processing
Computer Interaction

1.1 Computing Facilities

UMD students have access to a variety of computing facilities.

C.S. Computing Facilities.

Each graduate Research Assistant and Teaching Assistant has a workstation on their desk that is purchased by the Computer Science Department or by faculty supporting that graduate student with grant funds. Each of these workstations are on the UMD network and has access to a printer. These workstations also have at least 22" or 24" LCD monitor.

The Department maintains five computing laboratories which are used for instruction. These are 1) the Computer Science Software Development Lab, 2) the Computer Science Wireless Classroom and Lab, 3) the Computer Science Networking and Hardware Lab 4) the Virtual Reality and Computer Graphics Lab. This lab is used primarily for research by Dr. Pete Willemsen but also supports CS 5721 (Computer Graphics) and the graduate classes CS 8721 (Advanced Computer Graphics) and CS 8561 (Human Computer Interaction), 5) Health Informatics and Natural Language Processing Laboratory. This lab is used primarily for research by Dr. Ted Pedersen.

1. The CS Software Development Lab (Heller Hall 314): this lab consists of 9 HP Compaq 6005 PCs and 10 HP Elite 7100 PCs with 22" LCD monitors running Linux, one HP All-in-One PC running Windows XP, and 5 22" IMACS running OSX 10.6 Snow Leopard. This laboratory is maintained and updated by the Computer Science Department System Administrator. An abbreviated list of the software would include: most GNU tools focusing on programming, word processing tools such as Open Office and any specialized software needed for a particular course. This lab also has a printer. Access to the lab is provided by magnetic keycards; the lab is open to all students taking advanced Computer Science courses 24 hours a day.

2. The Computer Science Wireless Classroom and Lab (HH 306): this lab is in one of our two classrooms controlled by the Computer Science Department and the equipment is stored in locked cabinets along the walls of the classroom when not in use as a lab. The lab consists of 16 Gateway M465-E Laptops running Windows 7. The CS Wireless Classroom and Lab supports our Database courses which employ Oracle database software which is directly installed on these computers. The lab is available during scheduled lab times (two hours for each class) and then 8-12 hours per week under the supervision of a graduate or undergraduate TA (generally between the hours of 4 and 8 pm).

3. The CS Networking and Hardware Lab (MWAH 187): this lab consists of 18 Dell Inspiron 530 PCs with 22" LCD monitors running Linux. Each of the machines has a hard-drive tray and a removable hard drive. Students who take classes using this lab are issued a hard drive, which can be stored in a cabinet (students are issued personal keys to a cubbyhole in the cabinet). The computers are networked using internet connections that require authentication,

making it possible for users to install and change operating systems and to change network settings. This allows upper division classes to install and test a wide variety of system settings. In addition, the connected storage room for this lab houses a networking rack with 16 laptop PCs which are connected to the computers in the main part of the lab. These PCs allow networking classes to further test a variety of networking settings on a much larger network. This lab includes a 50" Plasma display with a SmartBoard interactive overlay to allow this display to be used as a whiteboard. This display is attached to a Dell XPS running both Windows XP and Ubuntu (dual boot). This lab also has magnetic keycard access and is available to students registered in these classes 24 hours a day.

4. Simulation and Interaction in Virtual Environments Lab (SIVE Lab) (MWAH 143): This is primarily a research lab though it is also used for some classes and consists of a 21ft x 33ft space containing a WorldViz PPTx4 Precision Position Tracker system. The tracker system is primarily used to track the movements of users wearing a NVIS nVisor SX Head Mounted Display (HMD) system, but is also used to track up to 3 additional markers (such as the user's hands or a pointing wand). Intersense InertiaCubes are used to independently track orientation of the user's head and hands. The lab's HMD, an nVisor SX, has a resolution of 1280x1024 and diagonal field of view of 60 degrees. This equipment allows us to provide an interactive, immersive experience in which people are able to walk around using their own locomotive abilities in a simulated 3D space. The lab also has two dual-core Linux PCs with NVIDIA GeForce 8800 Ultra graphics cards are used to generate left-eye and right-eye images for stereoscopic visuals in the HMD. The lab also houses five additional Linux PCs equipped with a range of current graphics cards. A separate dual processor 2.5GHz Apple PowerMac is also used for research and education purposes. Two Sensable PHANTOM Omnis are available and can provide haptic, force feedback information about the virtual environment. The lab is used for research, as well as teaching classes on Computer Graphics (CS 5721, a CS elective class, CS 8721, a graduate CS class) and Human-Computer Interaction (HCI) CS 8561) in virtual environments. Both undergraduates and graduate students work in the lab on a regular basis. Access to the lab for classes is scheduled by the instructor.

5. Health Informatics and Natural Language Processing Laboratory (HH 330) This is a research lab used by Dr. Pedersen and the students, post-doctoral researchers, and visitors that work with him on problems at the intersection of natural language and health care. The lab is home to a number of Dell servers that provide 24/7 access to Web services to hundreds of users around the word, and typically satisfy over 10 million requests per year. It also features a number of Dell workstations for desktop use. These computers all run Linux, and rely upon open-source software to the greatest extent possible.

In addition to these resources, the Computer Science Department has a Dell PowerEdge R900 compute server which is available to students in advanced classes that has 4 Quad Core processors, 32 GB of RAM and 1TB of storage and runs Ubuntu Linux. This machine is often used in classes for extremely large jobs and for undergraduate research purposes. The Department has also purchased a file storage system consisting of a SunFireX4500 with 2 Dual Core processors, 16GB of RAM and 24 TB of storage. This machine is used to give Computer Science and Computer Information Systems students much larger storage partitions to make it possible to work on systems that require significant space (e.g., JavaBeans really needs a fairly large partition).

U.M.D. Computing Facilities
UMD's Information Technology Systems and Services (ITSS) provides a wide range of computing services including networking, computing labs (using a variety of hardware/software platforms) and a wide range of application software. To learn more about the resources available to students, visit the ITSS website.

1.2 The Faculty

A listing of departmental faculty, along with a brief description of teaching and research interests and a recent publication, follows:

Carolyn Crouch, Ph.D., Professor of Computer Science, Director of Graduate Studies

Teaching and research interests: text and information processing, web-based retrieval, computer security, operating systems, computer ethics.

Publication: A Methodology for Producing Improved Focused Elements, *Focused Retrieval and Evaluation (INEX 2009*), Geva, S., Kamps, J., Trotman, A., (Eds.), LNCS, vol. 6203, pp.70-80. Springer, (2009). (with D. Crouch, D. Bhirud, P. Poluri, C. Polumetla, and V. Sudhaker)

Donald Crouch, Ph.D., Professor of Computer Science

Teaching and research interests: Textual analysis and retrieval, database systems

Publication: Dynamic element retrieval in the Wikipedia collection, *Focused Access to XML Documents,* Fuhr, et. Al. (eds) *(*INEX 2007). LNCS 4862, 70-79, Springer, 2008. (with C. Crouch, N. Kamat, V. Malik and A. Mone)

Timothy Colburn, Ph.D., Associate Professor of Computer Science, Career Advisor and Internship Coordinator

Teaching and research interests: software engineering, philosophy of computer science.

Publication: Abstraction, Law, and Freedom in Computer Science, *Journal: Metaphilosophy, volume 41, no. 3,* 345-364 (April 2010).

Douglas Dunham, Ph.D., Professor of Computer Science

Teaching and research interests: computer graphics, visualization, 3D rendering, hyperbolic geometry, user interface design.

Publication: Creating Regular Repeating Hyperbolic Patterns, *5th Mathematics & Design International Conference Proceedings* (2007).

Richard Maclin, Ph.D., Professor of Computer Science and Head

Teaching and research interests: data mining, machine learning, bioinformatics, database management systems, artificial intelligence, robotic learning.

Publication: Online Knowledge-Based Support Vector Machines (PDF). *Proceedings of the European Conference on Machine Learning,* Barcelona, Spain, (ECML 2010). (with Kunapuli, K.P. Bennett, A.Shabbeer, J. Shavlik)

Ted Pedersen, Ph.D., Professor of Computer Science

Teaching and research interests: natural language processing, computational linguistics.

Publication: Empiricism in Not a Matter of Faith, *Computational Linguistics, Volume 34, No. 3,* 465-470 (September 2008).

Gary Shute, Ph.D. Associate Professor of Computer Science

Teaching and research interests: software engineering, data structures, algorithms, computer architecture, computational geometry.

Publication: Abstraction in Computer Science, *Minds and Machines*: *Journal for Artificial Intelligence, Philosophy, and Cognitive Science* 17:2, 169-184 (2007) (with T. Colburn)

Hudson Turner, Ph.D., Associate Professor of Computer Science

Teaching and research interests: knowledge representation, automated planning and reasoning about action, declarative logic programming, finite-domain satisfiability solvers.

Publication: Nonmonotonic Causal Logic, *Handbook of Knowledge Representation*, Elsevier, edited by Frank von Hermelen, Vladimir Lifschitz, and Bruce Porter, 759-776 (2008).

Christopher Prince, Ph.D., Associate Professor of Computer Science

Teaching and research interests: artificial sensation, artificial intelligence, human-computer interaction, computational models of learning, cognitive science.

Publication: The Fly by Feel Project: The Hope of Experiencing Flight More Like a Bird or Bat. *Soaring, the Magazine of the Soaring Society of America, volume 73, no. 12* (December 2009) (Prince, C.G. and the Fly by Feel Team)

Peter Willemsen, Ph.D., Associate Professor of Computer Science

Teaching and Research Interests: computer graphics, perception in graphics, and human-computer interaction with emphasis on immersive virtual environments. Agent-based behavior modeling and representation, and haptics.

Publication: Natural Perspective Projections for Head-Mounted Displays, *IEEE Transactions on Visualization and Computer Graphics (TVCG).* (Accepted for publication). (with F. Steinicke, G. Bruder, M. Lappe, S. Kuhl and K.H. Hinrichs)

2. ADMISSION INFORMATION

All applications to the Computer Science Graduate Program are now handled electronically through the ApplyYourself interface. General information on the application process is found on the UMD Graduate School Office web page at http://www.d.umn.edu/grad/ along with access to the automated application interface.

Applicants are encouraged to submit applications early in the year, which allows time to resubmit material that may be missing and enables the department to consider requests for financial aid in a timely fashion. See Section 2.2 (below) for deadlines. *Please note that all transcripts must be uploaded to the Apply Yourself (AY) website.*

The Computer Science Department requires as a part of the application packet an official report of the scores received by the applicant on the Graduate Record Examination (GRE) General Test. Specify university code 6873 for UMD so that your official score may be retrieved from ETS.

2.1 Departmental Information

Some applicants may be interested in the following information:

The GRE Subject Test:
The Department does not require that applicants take the GRE Subject Test in Computer Science. However, an applicant seeking to support his/her application may wish to submit an official report of his/her scores, especially if the undergraduate degree is in a related field.

If your native language is not English:
Each applicant whose native language is not English must submit a record of the scores received on either the TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System).

For TOEFL: Specify the University of Minnesota Duluth, code number 6873, for reporting purposes. The Graduate School requires a score of 550 on the written test and 213 on the computer-based test. The department gives preference for financial support to those with minimum scores of 650 (written test).

For IELTS: The Graduate School will accept scores from the IELTS in lieu of the TOEFL. See www.d.umn.edu/grad/ or http://www.deii.org for details. The minimum acceptable score on the IELTS is 6.5.

Foreign Applicants:
Each foreign applicant must submit an International Financial Certification Statement before a visa will be issued. See the UMD Graduate School Office web page for information.

Financial Aid:
Any applicant seeking financial aid should supply additional information as indicated in Section 3. The Application for Graduate Assistantship is available at http://www.d.umn.edu/grad/pdfs_docs/Application-Graduate-Assistantship.pdf. This form and the required recommendations should be submitted with the application through the ApplyYourself System.

Fall Admissions Policy:
Under normal circumstances, the Computer Science Graduate Program restricts its admissions to once a year. All applicants are evaluated in the spring for admission the following fall semester. Under exceptional conditions a student may be admitted during the spring if s/he has completed all necessary prerequisite coursework and demonstrated the ability to perform at the graduate level. Any such circumstances must be discussed in advance with the DGS.

2.2 Application Deadlines

The department processes applications as they are received. Thus it is in the applicant's best interests to submit his/her application early in the cycle (i.e., by **January 15th** if possible). Early application enhances the opportunity for financial aid.

February 1- March 14, 2012 -- Initial Round of Financial Aid Decisions

The decisions on admissions and financial aid for the next academic year are made during this period. To be considered in the first round, an applicant must have submitted an admissions application by March 15.

March15 - April 15, 2012 -- Notification of Financial Aid

The department makes its offers of financial aid as early as possible in the spring of the year. Although we attempt to make all offers by April 15th, for various reasons during a particular year this may not be possible. In this case, offers may be made as late as April 30th. If you are awarded financial aid, you will be notified by email no later than April 30th.

Due to the large number of applications received, the department is unable to inform you personally if you have not been awarded aid. However, funding may become available later in the year, so if you are interested in this possibility, please notify the department via email and your name will be kept on file. You will then be considered for any financial aid that subsequently becomes available for the next academic year.

April 15, 2012 -- Council of Graduate Schools Deadline

Note that the University of Minnesota Duluth subscribes to the Resolution of the Council of Graduate Schools in the United States, and every offer of financial aid in the form of a Teaching or Research Assistantship is subject to this Resolution as a term of employment (see Section 8). This resolution specifies that acceptance of an offer of

financial aid is an agreement that both student and graduate school are expected to honor. To quote:

“When a student accepts an offer before April 15 and subsequently desires to withdraw, the student may submit a written resignation for the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment was made. Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer."

Please note that any student who accepts a Teaching or Research Assistantship from the department, fails to submit a written resignation prior to April 15, and enters the country on our form I-20 will be strictly held to the conditions of employment to which s/he has agreed. Under no circumstances will such a student be given a written release since at this point it is then too late to fill the position.

Re inquiries on the status of admission: The department regrets that it is unable to answer email or telephone inquiries about the status of an application. However, email inquiries may be directed to the department at cs@d.umn.edu and we will reply as time permits.

July 15, 2012 -- Deadline for Fall 2012 Admission

2.3 Entrance Requirements

The program is designed for those with undergraduate degrees in either Computer Science or Computer Engineering. These students should be able to enroll immediately in 8000-level computer science courses. All such students should have completed the following courses or their equivalents: CS 3512 (Computer Science Theory), CS 5621 (Architecture) or CS 5651 (Computer Networks), and CS 5631 (Operating Systems) prior to enrollment.

Students with other backgrounds may be considered if they have completed the following courses or their equivalents: CS 1511 and 1521 (Computer Science I and II), CS 2511 (Software Development), CS 2521 (Computer Organization), CS 3511 (Computer Science Theory) or both CS 4511 (Automata, Computability, and Formal Languages) and CS 4521 (Advanced Data Structures and Algorithms), CS 5621 (Architecture) or CS 5651 (Computer Networks), and CS 5631 (Operating Systems). The appropriate math prerequisites, namely, Math 1296 and 1297 (Calculus I and II), and Statistics 3611 (Probability and Statistics) are also required. Students who lack only a small subset of these required courses may be admitted at the discretion of the DGS based on the recommendation of the Graduate Committee. The GRE General Test is required of all applicants; the TOEFL is also required of international students.

2.4 Ethical Considerations

The Department of Computer Science adheres to the tenets of the ACM Code of Ethics and Professional Conduct. Any student found to be in violation of this code or the UMD Code of Student Conduct will be subject to immediate dismissal. Such violations include plagiarism and the inappropriate access of computing resources (e.g., attempts to violate system security, access files belonging to others, forge/falsify email, download inappropriate or copywrited files, etc. using university equipment). See Section 7.3, Policy on the Appropriate Use of Information Technology for details.

3. FINANCIAL AID

Half-time Teaching and Research Assistantships are available to qualified students. These currently pay $13,385 per academic year. Research assistantships funded by the National Science Foundation or other agencies may be available. All half-time (50%) assistantships and fellowships carry a tuition waiver. Applicants for Teaching Assistantships are expected to know C, C++, Java, and Visual Basic.

Financial aid in the form of teaching assistantships is available through the department. The number of assistantships available is limited, however, and once a student has committed him/herself to accept an assistantship, any subsequent failure to meet that commitment seriously and negatively impacts the department and its operation. Namely, (1) the department is left shorthanded in meeting the demand for its services during the next academic year, and (2) another deserving applicant is unable to attend graduate school because it is too late to offer the support to another student. ***With this in mind, we ask that you carefully evaluate your position before accepting a teaching assistantship with us. Should you for some reason be unable to fulfill the stipulations set forth in the letter of offer, please notify the department at once so that another student may be offered the funding.***

When applying for financial aid please specify a **fax number**, **telephone number**, and an **email address** where you may be reached ***at any time*** during the year ***(including summer*)**.

Summer support may be available from one's advisor through research funding. If the advisor is unable to provide it, support may be available for summer research from the DGS through the University of Minnesota Block Grant Fund program. These funds, when available, are targeted at Plan A students, namely, second year students who are completing their theses and first year students working with their advisors on continuing research initiatives.

Should you accept financial support from the department in the form of a Teaching or Research Assistantship, please note that additional information is due in our office by these deadlines:

June 15, 2012: Verification of Visa

A copy of the official verification from the consulate that you have been granted a visa to enter the U.S., i.e., a copy of the page in your passport with the sticker applied by the U.S. consulate. Fax this copy to us at 218-726-8240.

August 1, 2012: Verification of Travel Arrangements

Your travel arrangements (i.e., flight numbers and dates, including date of arrival) must be emailed to Ms. Lucia in our office by this date. Arrangements will be made for someone affiliated with the department to meet you when you arrive.

3.1 Financial Aid Application

When applying for a departmental teaching or research assistantship, each applicant must complete a financial aid application (see below), which is separate from the admission application.

The deadline for initial consideration for financial aid is March 14. Later applications will be considered until all appointments are filled. The following materials are required to process an application for financial aid:

1. An application for financial assistance which may be found at http://www.d.umn.edu/grad/pdfs_docs/Application-Graduate-Assistantship.pdf

2. The completed application, sent by the applicant to the Graduate School using the ApplyYourself system.

3. Three letters of recommendation, submitted through the ApplyYourself interface. These letters should address in particular any teaching experience you have had and how successful it was, along with direct comments on your ability to understand, write and speak English. (The department reserves the right to process, at its discretion, applications with fewer than three letters of recommendation.)

4. Any additional material that the applicant believes may enhance his/her application for financial aid (such as an official report of the scores received on the GRE Subject Test in Computer Science).

3.2 Costs

The information in this section is current as of Fall, 2011.

Resident tuition for a full-time student is $7,006.00 per semester. Non-resident tuition is $10,733.00 per semester. All full-time students are assessed approximately $700

per semester in non-waivable fees. A late registration fee will be assessed for any initial registration which occurs on or after the first day of classes: $50 during the first or second week, and $100 thereafter. A student with a half-time assistantship receives a tuition waiver equivalent to $7,006.00 each semester; federal income tax is payable on the value of the tuition benefit. Any student fees, tuition costs over 14 credits and/or late fees are the responsibility of the student.

No one is allowed to register without proof of hospitalization insurance. Any student who registers for at least 6 credits and is without medical insurance is offered an inexpensive student-only policy for $950.00 per semester. Anyone eligible for the student-only policy may insure a spouse (at $1,230.00 per semester) and children (at $936.00 per semester for one child and $1,296.00 per semester for more than one child).

Approximately $300.00 in additional fees is charged per semester for the use of University computing facilities.

Housing in Duluth is relatively inexpensive compared to many parts of the country. The department does not make housing arrangements for incoming students. The University residence hall information can be obtained by emailing housing@d.umn.edu or by writing UMD Housing Office, 149 Lake Superior Hall, 10 University Drive, Duluth, MN 55812-2496, phone 218-726-8178. Most graduate students live off campus. One of the resources for International students is Trisha O'Keefe (pokeefe@d.umn.edu) in the International Student Adviser office. Another resource is Mary Jo Bowman (mbowman@d.umn.edu) in the Kirby Student Center. This office lists off-campus housing available in the Duluth area.

4. REQUIREMENTS FOR A M.S. DEGREE IN COMPUTER SCIENCE

The Master of Science in Computer Science is offered under two plans. Most students will undertake Plan A, which involves writing a thesis. Plan B involves additional course work and a project in lieu of the thesis.

The requirements for the completion of the M.S. in Computer Science are listed below.

4.1 Residency

The normal timeframe for completion of the coursework and research required for a Master's degree in Computer Science is four semesters. (This timeline may be adjusted for part-time students.) All students who receive financial aid in the form of a Teaching Assistantship should understand that such assistantships are given only for a full, one-year period (two semesters) and are renewed (subject to satisfactory performance and progress toward the degree during the first year) for a second year. Students accepting Teaching Assistantships should plan to spend two years in residence. Support beyond the normal two-year period is not available from the department.

4.2 Performance

Satisfactory performance is judged on the basis of one's academic progress and ability to carry out departmental responsibilities in the areas of teaching (for TAs) and research (all graduate students). Satisfactory performance for a teaching assistant is also based on his/her ability to communicate effectively in English, both on an individual basis and in a classroom environment. Should a teaching assistant fail to meet this requirement during his/her first year, the assistantship will not be renewed for a second year. In addition, each graduate student must progress satisfactorily in his/her own research program. This requires each student to (1) have his/her thesis/project proposal approved by both the advisor and the Director of Graduate Studies by the specified due date, (2) receive a favorable written evaluation from his/her academic advisor at the end of each semester, and (3) maintain active student status by following registration guidelines for fall and spring semesters and filing milestone forms according to the timelines in this document. A minimum GPA of 3.0 is required for graduation. The department does not count S/N credits toward graduation.

The Graduate School Constitution requires a written evaluation of each graduate student each semester. *This review is conducted by the student's academic advisor.* The review annotates the student's progress toward his/her research goals during the semester and concludes with a finding of either satisfactory or unsatisfactory progress. The review is shared with the student and becomes part of his/her permanent file. Any finding of unsatisfactory progress must be discussed by the advisor with both the student and the DGS prior to the beginning of the next semester. The student may request a subsequent discussion with the DGS if desired.

Satisfactory progress toward the degree, maintained on a semester basis, is required in order for a graduate student to receive or retain financial assistance from the department. *Satisfactory progress* entails (1) maintaining a minimal grade point average of 3.00, and (2) completion of the required coursework for the semester (i.e., a minimum of 8 graduate credits, including one 8000-level CS course, Graduate Seminar, and one additional course of 3 or more credits during the first semester; a minimum of 7 graduate credits, including one 8000-level CS course and one additional course of 3 or more credits during the second semester; one 8000-level CS course plus thesis credits or additional coursework as required by the Plan during the third semester; and one 8000-level CS course plus thesis credits or additional coursework as required by the Plan during the fourth semester. Any graduate student currently receiving financial aid who fails to meet these standards will not have his/her aid renewed.

The successful completion of a research program requires an ability to express one's thoughts and work in written form. The Graduate Program in Computer Science expects each of its students to produce a written document (e.g., thesis or project report) detailing his/her research project in accepted manuscript style (i.e., CBE). Students showing deficits in this area may be asked to take remedial work.

4.3 Courses

On the semester system, a minimum of 33 credits is required, including:

1. 16 credits from 8000-level courses in Computer Science (as approved by the Director of Graduate Studies [DGS]).

2. 1 credit of CS 8993, Graduate Seminar.

3. 6 credits from a specified set of courses outside of computer science (minor or related field, see below).

4. Additional credits, as required for your Plan option (see below).

Minor or related field: The purpose of this requirement is to provide coursework from another department which will support your degree program *without duplicating or overlapping* courses available within the CS curriculum. Such courses may be chosen from the mathematics, statistics and/or ECE courses subject to approval of the DGS.

Graduate students may take additional courses either from within the department or outside it. However, all courses used to fulfill the minor or related field requirement must first be approved by the DGS. The Graduate Program does not allow the use of S/N credits for courses contributing toward the degree. Up to 12 credits of graduate coursework may be transferred in as part of a student's degree program, subject to the discretion of the DGS. Transfer credits do not reduce the departmental requirement of 16 credits at the 8000-level. University guidelines impose a 7-year limit on the completion of requirements for the Master's degree.

The department reserves the right to determine which option (thesis or project) is taken by the student. In particular, we expect that all students with strong computer science backgrounds (i.e., those with undergraduate degrees in Computer Science or a closely related field such as Computer Engineering) will take the thesis option. Some students with undergraduate degrees in other disciplines may be allowed to choose the project option.

4.4 Additional Requirements for Plan A (Thesis Option)

1. 10 credits of CS 8777 (Thesis).

2. Departmental colloquium, during which the student presents his/her research results.

3. The satisfactory completion of an oral examination focusing on the thesis and supporting area(s).

4.5 Additional Requirements for Plan B (Project Option)

1. 10 additional credits from courses in Computer Science at the 5000 level or above, as approved by the DGS.

2. Completion of an approved Plan B project (usually a significant programming project).

3. A departmental colloquium based on the project, presenting the results of that work.

4. The successful completion of an oral examination covering the project, supporting area(s), and graduate-level computer science courses.

4.6 Degree Papers and the Thesis/Project Proposal

Degree Papers: All graduate students in the Computer Science Department are assigned an advisor when they arrive on campus and are required to complete either a thesis or project under direction of the advisor. After completing a specified number of hours of graduate work, the student is required by the Graduate School to complete his/her *degree papers* (otherwise a *hold* is placed on the student's record preventing registration for the next semester). Degree papers include (1) the degree program form (or degree plan), listing the courses the student will take to complete the graduate program; (2) the degree program transmittal form, which specifies the student's committee (composed of his/her advisor, another member of the computer science faculty, and a faculty member from the student's related field), and an unofficial transcript. The student's advisor must sign both items (1) and (2), above. It is the advisor's responsibility to verify, prior to the student's exam and colloquium, that the student's transcript is in agreement with his/her degree program form. All paperwork is examined for compliance by the Graduate School prior to the student's exam and colloquium using their degree clearance procedures.

A change of advisor may be occasioned by the dissatisfaction of advisee and/or advisor with either one's work or the advisor/advisee relationship. The DGS will work with all parties to reach a satisfactory resolution of the problem in the best interests of the student and department.

Thesis Proposal: The thesis/project proposal is a brief, typewritten document, 4 pages in length. (A copy of the Thesis Proposal Form is available in the CS office.) The proposal delineates: (1) the research problem to be solved; (2) a brief literature review, which sets the framework for the research and cites recent references which establish the importance of the work/problem to be solved (3) the resources (in terms of software and hardware) required to complete the work; (4) the steps required to solve the problem along *with a specific target date for the completion of each step;* (5) a clear description of how the results of the research will be evaluated; and (6) (for a thesis) the contribution to research that this work will make. Note with reference to item (4), above, that the last two steps in this list should be the write-up of the

thesis/project and the completion of the oral exam and colloquium, respectively. The advisor and student indicate their agreement (with respect to the tasks to be done and the dates by which each task is to be accomplished) by signing the last page of the proposal.

The student then submits two sets of documents to the department: his/her degree papers and thesis/project proposal. All must be signed by the advisor prior to submission. All documents must be turned in to the executive secretary in the departmental office on or before the due date.

Proposal Review: The proposal is then forwarded to a review committee for evaluation. A blind review of each proposal follows standard procedures and may take up to two weeks. The reviewers may (1) approve the proposal as is or (2) ask for a written response to specified questions (this response is due within one week). In case (2), the reviewers will evaluate the responses to the questions within one week. Once approved, it is signed by the DGS and maintained in the student's file.

4.7 Colloquium and Oral Exam

The colloquium is a one-hour presentation by the student of his/her research. It is immediately followed by a one-hour oral exam, which is directed by the advisor with input from the other members of the student's committee. The colloquium has a specific format: (1) introduction (statement of the problem); (2) background; (3) description of the research itself; (4) the results of this research; and (5) conclusions and suggestions for future work. In no case should items (1) and (2) consume more than 25 minutes of the presentation.

4.8 Records and Departmental Policies

Each graduate student has a graduate academic record file that is kept in the department. This file contains the student's application to the Computer Science Graduate Program, transcript(s), immigration documents, social security information, semester-based progress reports from the advisor, verification of required inoculations (i.e., TB), and any record of disciplinary action associated with the student. Faculty and staff have access to this file on a need-to-know basis as per FERPA regulations. The student may have access, per written request to the DGS, to any information in the file to which s/he has not waived viewing rights.

The Department Chair is the chief administrative officer of the department. The Chair is responsible for making TA assignments, handling disciplinary matters relating to work issues, and determining whether TA (work) performance meets the qualifications for continued funding. The Director of Graduate Studies is the advisor of record for all graduate students. S/he directs the program and advises graduate students on all matters which do not directly relate to the student's research topic. The DGS, working with the Graduate Committee, evaluates applicants and hires RAs and TAs. S/he monitors the progress of students, works with students and faculty to resolve any problems which arise, supervises the evaluation of thesis proposals, and communicates regularly with students on matters which affect them. The department's

executive secretary provides much needed support with respect to employment contracts and related issues, budgetary matters, and maintenance of records.

Each UM student has an email account which serves as the University's official method of communication. Graduate students have access to telephones for local calls. Each graduate student employed by the university has his/her own mailbox in the department to facilitate communication with faculty, staff, and other students. TAs and RAs may also utilize copy machines in the department as directed by office staff.

Travel funds are available to graduate students from various sources. These may include the student's advisor, the offices of the collegiate and/or graduate Dean, and particular funds designated for this purpose by the University of Minnesota Graduate School. Partial funding is available from the offices of both the Graduate and CSE Deans for students presenting papers at conferences. Other funding may be available; it is the student's responsibility to investigate and identify potential funding sources.

4.9 2011-12 Schedule with Important Dates

Work Schedule: All Graduate Assistants are employed by the department and hence subject to the university calendar. Official university holidays are specified in the calendar; these are the dates on which the university will be closed and UMD employees may legitimately be absent from campus. Graduate Assistants are paid 39 weeks during the academic year and must be on campus during this time, except for *official university holidays*. This work period *includes the week preceding the start of classes and the week of and immediately following final exams.* The official university holidays are Labor Day and Thanksgiving (for Fall semester), Christmas, New Year's holiday and Martin Luther King Day (during Semester Break).

At the end of classes each semester, Graduate Teaching Assistants are expected to be available to assist the faculty in grading student work and determining grades. Also, during the work period between fall and spring semesters, teaching assistants are expected to assist the faculty in preparing handouts and materials for the next semester. Assistants should not plan on being absent from the campus between semesters except for the official school holidays. Similar work rules apply to Graduate Research Assistants: GRAs are expected to be present to conduct research and to work with their faculty supervisors during any regularly scheduled workday. *The only periods during which a Graduate Teaching or Research Assistant may be absent from campus without the explicit permission of the department head is during an official university holiday* (as listed above).

To reiterate: **Graduate Assistants are to be present on campus for the entire academic year—from the fall starting date to the spring terminal date of employment—except for official university holidays.** Dates for the 2011-12 academic year are given below.

Fall Semester Starting Date: August 29, 2011 [All TAs must be present on campus]
Labor Day Holiday: September 5, 2011 [official university holiday]
Thanksgiving Holiday: November 24--25, 2011 [official university holiday]

Final Exams: December 17 and 19--22, 2011
Christmas Holidays: December 23--27, 2011 [official university holiday]
New Year's Holidays: January 2-3, 2012 [official university holiday]
Martin Luther King Day: January 16, 2012 [official university holiday]
Spring Semester Starting Date: January 17, 2012
Final Exams: May 7--11, 2012
Graduate Commencement: May 10, 2012
Spring Semester Terminal Date: May 27, 2012
Graduate Offices Vacated: August 15, 2012 [all labs/offices closed for maintenance]

NOTE: Graduate Assistants who are absent from campus in violation of the stated policy are subject to the following penalties: deduction from paycheck in the amount of time missed; loss of tuition benefit covering time in question (the student must then pay this amount from his/her own funds); and a written reprimand inserted in his/her file. Any recommendations made by the faculty with respect to the student in question may be affected as a result.

For All First Year Students: Additional Dates of Importance

1. **Thesis Proposal Deadline**: The thesis proposal, signed by both advisor and DGS, must be completed by November 11, 2011. Follow the guidelines provided in the Graduate Brochure (see Section 4.6).
2. **Degree Program Transmittal/Degree Program**: The deadline for completion of these forms is also November 11, 2011. Follow the Guidelines for Degree papers available in the office.
3. **Registration for the Next Academic Year:** All first year graduate students must complete their registrations for the upcoming Fall semester by May 18, 2012. This registration must agree with the courses listed on the Degree Program. All TA assignments for the next academic year are made based on this registration.

For All Second Year Students: Additional Dates of Importance

1. **Degree Program**: The deadline for completion of the Degree Program is the 6th of January, 2012. Graduate School approval of program must be granted by the 17th of February.
2. **Application for Degree**: This form must be completed and submitted to the departmental executive secretary by February 17, 2012.
3. **Commencement Ceremony**: The department requires that all of its graduating (i.e., second year) students participate in the Graduate Commencement Ceremony. This is a reflection of the contribution of the Computer Science Graduate Program to the University and of the research and professional accomplishments of its students and faculty. The Spring, 2012 commencement will be held the evening of Thursday May 10, 2012.

5. SELECTED COURSE DESCRIPTIONS

Only credits from courses numbered 5000 and above can be applied toward a master's degree in computer science.

Students who need undergraduate courses to satisfy the prerequisites of our 5000-level courses are encouraged to complete course equivalents before coming to UMD.

CS 5541. ARTIFICIAL INTELLIGENCE (4 cr; prereq CS 2511, 3511, or 3512 #)

Principles and programming methods of artificial intelligence. Knowledge representation methods, state space search strategies, and use of logic for problem solving. Applications chosen from among expert systems, planning, natural language understanding, uncertainty reasoning, machine learning, and robotics. Lectures and labs will utilize suitable high-level languages (e.g., Python or Lisp).

CS 5551. USER INTERFACE DESIGN (4 cr; prereq CS 2511, (Math 1297 or Math 2326) or #)

Design and layout of interactive programs using components, containers, events, menus, and dialogs. The use of graphics primitives, color and images; giving user feedback and help. Rapid prototyping and interface management systems. Design for accessibility and usability.

CS 5621. COMPUTER ARCHITECTURE (4 cr; prereq CS 2521 or #)

Advanced concepts in processor and computer system organization and their impact on performance. Exploitation of parallelism, multilevel memory organization, system interconnection, and input-output organization.

CS 5631. OPERATING SYSTEMS (4 cr; prereq CS 2511, 2521 or #)

The operating system as a resource manager. Processor management and scheduling, deadlocks, concurrency, memory management, protection and security, as applied in modern operating systems. Concepts are illustrated via laboratory assignments which heavily emphasize concurrency.

CS 5641. COMPILER DESIGN (4.0 cr; Prereq-(2511, 2521, 3511) or (2521, 3512) or #)

A selection from the following topics: finite-state grammars, lexical analysis, and implementation of symbol tables. Context-free languages and parsing techniques. Syntax-directed translation. Run-time storage allocation. Intermediate languages. Code generation methods. Local and global optimization techniques.

CS 5651. COMPUTER NETWORKS (4 cr; prereq CS 2511, 2521 or #)

Introduction to computer networking, network programming, networking hardware and associated network protocols. Layered network architecture, network services, and implementation of computer networking software.

CS 5721. COMPUTER GRAPHICS (4.0 cr; Prereq-2511, (CS 3511 or Math 2326) or #)

Mathematics for computer graphics, basic raster algorithms, 2D and 3D transformations and viewings. The graphics pipeline including visible surface determination, shading, tranformations, and viewings. The graphic pipeline including visible surface determination, shading, ray-tracing, texture mapping, and clipping. Data structures: triangle meshes, scene graphs, ray-tracing, texture mapping, and clipping. Data structures: triangle meshes, scene graphs. Graphics applications using software systems such as Open GL.

CS 5741. OBJECT-ORIENTED DESIGN (4.0 cr; Prereq-(2511, 3511) or 3512 or #)

Overview of software design and design methods, focusing on object-oriented design. Impact of object and class organization on software maintenance and reusability. Implementation of a significant project using object-oriented methods and tools.

CS 5751. INTRODUCTION TO MACHINE LEARNING (4.0 cr; Prereq-(2511, 3511, Stat 3611) or (3512 or Stat 3611) or #)
Survey of methods in machine learning including supervised and unsupervised methods. Topics covered may include clustering, decision trees, neural networks, support vector machines, genetic algorithms and reinforcement learning. Theoretical concepts associated with machine learning.

CS 5761. INTRODUCTION TO NATURAL LANGUAGE PROCESSING (4.0 cr; Prereq-(2511, 3511) or 3512 or #)

Techniques for creating computer programs that analyze, generate, and understand natural human language. Topics include syntactic analysis, semantic interpretation, and discourse processing. Applications selected from speech recognition, conversational agents, machine translation, and language generation. Substantial programming project required.

CS 5994. ADVANCED TOPICS IN COMPUTER SCIENCE (Various Titles to be Assigned). (4 cr; prereq CS grad or #)

Research-oriented study of topics of current academic or industrial interest, such as parallel algorithms, VLSI design, computational geometry, logic programming languages, program correctness, information retrieval systems, and decision support systems.

CS 8333. FTE: MASTER'S (1 cr; prereq Master's student, adviser and DGS consent)

CS 8511. ADVANCED THEORY OF COMPUTATION (4 cr; prereq CS 4511 or #, CS grad)

Mathematical theory of computability and computational complexity. Deterministic and nondeterministic Turing machines. Recursive and recursively-enumerable languages. Undecidable problems, Rice's Theorem, the Church-Turing thesis. Time and space complexity. P-time reductions, completeness for complexity classes, Cook's Theorem, P=NP, and the polynomial hierarchy.

CS 8561. HUMAN COMPUTER INTERACTION (4 cr; prereq CS 5551 or 5721, CS grad)

Introduction to the software algorithms, hardware components, and concepts for building and evaluating virtual environments for effective human-computer interaction (visual, auditory, haptic, and mechanical aspects). Includes the perceptual components for constructing effective human-computer interaction with a virtual environment.

CS 8621. ADVANCED COMPUTER ARCHITECTURE (4 cr; prereq CS 5621, CS 5631 or #, CS grad)

Algorithmically-specialized functional units. Principles of advanced memory subsystem organization, including virtual memory and caches. Novel hardware technologies. Foundations of parallel architectures: from supercomputers to cluster environments. Advanced hardware/software performance analysis.

CS 8631. ADVANCED SYSTEMS PROGRAMMING (4 cr; prereq CS 5631, 5641 or #, CS grad)

Overview of the systems programs with emphasis on unifying themes common to major application areas such as compiler construction, operating systems, and networks. Advanced study of practical aspects of one of these systems, including a substantial software development project.

CS 8721. ADVANCED COMPUTER GRAPHICS (4 cr; prereq CS 5721 or #, CS grad)

Contemporary computer graphics techniques. Focus on advanced graphics algorithms and programming, curve and surface representations, physically based rendering, visible surface determination, illumination, texturing, and real time rendering.

CS 8731. INFORMATION RETRIEVAL (4 cr; prereq CS 5731 or #, CS grad)

Methods, major models, and theoretical issues in automatic processing and retrieval of text. Statistical and syntactic approaches, very large database issues (data mining), distributed retrieval, web retrieval and relevant applications.

CS 8751. ADVANCED MACHINE LEARNING. (4 cr; prereq CS 5751 or #, CS grad)

Survey of emerging research topics in machine learning and data mining plus the relation of machine learning to fields such as bioinformatics. Topics drawn from emerging techniques such as support vector machines, ensemble methods, and Bayesian networks.

CS 8761. NATURAL LANGUAGE PROCESSING. (4.0 cr; CS 5761 or #; CS grad student; A-F only)

Techniques to analyze, generate, and understand human language via computational techniques. This course focuses on empirical approaches to lexical and syntactic analysis, semantic interpretation, and discourse processing. Applications include part-of-speech tagging, parsing, lexical acquisition, and machine translation.

CS 8771. ADVANCED COMPUTATIONAL LOGIC. (4.0 cr; CS 4511 or #; CS grad student; A-F only)

Mathematically sound reintroduction to classical logic. Syntax, semantics, and proof theory for propositional and first-order logic. Soundness and completeness. Incompleteness. Additional topic(s) from among: automated theorem proving, second-order logic, nonmonotonic logics and knowledge representation, logic programming.

CS 8777. THESIS CREDITS: MASTERS (1-16 cr [max 11 cr per summer term]; CS grad)

Thesis research and development.

CS 8993. SEMINAR (1 cr; CS grad and #)

Presentation and discussion of articles in the literature and/or current research in the department.

CS 8995. SPECIAL TOPICS: (Various Titles to be Assigned) (1-4 cr; prereq CS grad and #)

Study of a special topic at the graduate level in computer science not available in the standard curriculum. Topic announced in the Class Schedule.

6. GRADUATES

As of September 2011, 201 students have graduated from UMD as Masters of Computer Science. Their names, project or thesis titles, graduation dates, and research advisers are listed below.

Glenn Andreas, "Visual Navigation of the Search Process in a Clustered Document Space," Plan A, May 1989. Adviser: Donald Crouch.

Hui-Liang Low, "Matrix-Multiplication Problem Using Parallel Processing," Plan B, May 1989. Adviser: Keith Pierce.

Chi-Cheng Lin, "Showing Profile Curves and Hidden-Line Removal Algorithms," Plan B, May 1989. Adviser: Doug Dunham.

Bridget Rogers, "Modifying CAP to Provide Unix File Serving on a LAN of Mixed Macintoshes and DOS PCs," Plan A, May 1989. Adviser: Mark Luker.

Clyde Rogers, "Enhancements to Ziv-Lempel Data Compression," Plan A, May 1989. Adviser: Clark Thomborson.

Krishna Mohan Nareddy, "A Connectionist Model for Information Retrieval," Plan A, August 1990. Adviser: Donald Crouch.

Paul Durrant, "The Distributed Appointment Manager," Plan A, September, 1990. Adviser: Mark Luker.

Jeanne Dezell, "Clustering and Partitioning Techniques for Creating Rectilinear Steiner Trees," Plan A, October 1990. Adviser: Linda Deneen.

Ningjian Wang, "Intelligent and Visual Modeling of Linear Programming," Plan A, October 1990. Adviser: Donald Crouch.

Ching Tsui, "A Backward Defeasible Reasoning System," Plan A, March 1991. Adviser: Timothy Colburn.

James Fenno, "Heuristic Control of Constraint-Based Scheduling," Plan B, June 1991. Adviser: Timothy Colburn.

Renato Milanesi, "Optimal Look-Ahead Adders," Plan A, July 1991. Adviser: Clark Thomborson.

I-Chang Wen, "A Study in Software Engineering - Maintenance, Restructuring and Interfacing," Plan B, August 1991. Advisor: Douglas Dunham.

Sree Rama Peyyety, "A Proposal for Measurement Study of Ethernet Traffic," Plan B, August 1991. Adviser: Clark Thomborson.

Bokyung Yang, “Automatic Query Extension in Information Retrieval,” Plan A, September 1991. Adviser: Donald Crouch.

Yanzhang Lu, “Solving Combinatorial Optimization Problems by Simulated Annealing, Genetic Algorithms, and Neural Networks,” Plan A, September 1991. Adviser: Clark Thomborson.

Sudhamsa Gottipati, “An Improved Algorithm for Drawing Grid Surfaces,” Plan B, October 1991. Adviser: Douglas Dunham.

Amitabh Singhal, “Query Modification for Improved Information Retrieval,” Plan A, March 1992. Adviser: Donald Crouch.

Peter Tsai, “Rendering Objects in 3-Dimensional Hyperbolic Design Program,” Plan B, May 1992. Adviser: Douglas Dunham.

Gary Anderson, “Maintenance and Interface Design for a Hyperbolic Design Program,” Plan B, May 1992. Adviser: Douglas Dunham.

Xun Zhao, “An Interface for Transforming Information from TimberWolf to RanTer,” Plan B, May 1992. Adviser: Clark Thomborson.

Shashikant Joshi, “Treasurers in an Art Gallery,” Plan A, June 1992. Adviser: Linda Deneen.

Li Wei, “Displaying Three Dimensional Graphics with Contours and Hidden-Line Removal,” Plan B, August 1992. Adviser: Douglas Dunham.

Kanaiya Vasani, “A Network Management Tool Based on a Simple Network Management Protocol,” Plan B, March 1993. Adviser: Donald Crouch.

Srikanth Varanasi, “Surface Determination in 3-D Using Volume Rendering,” Plan B, April 1993. Adviser: Douglas Dunham.

Paul D. Kopecky, “Parallel Programming Using RPC,” Plan A, May 1993. Adviser: Gary Shute.

David D. Winslow, “A Neural Network Approach to the Prediction of S.E.C. Indictments,” Plan B, May 1993. Adviser: Timothy Colburn.

Yi Sun, “Delay Optimization of Carry Lookahead Adders Using Dynamic Programming,” Plan B, August 1993. Adviser: Clark Thomborson.

Craig Zwicky, “Restoring Files from the VMS/VAX,” Plan B, February 1994. Adviser: Mark Luker.

Parul Jain, "Visible Surface Determination using Ray Tracing and Transparency," Plan B, June 1994. Adviser: Douglas Dunham.

Ravishanker Nandiwada, "A Tuning Algorithm for Fuzzy Modeling," Plan A, July 1994. Adviser: Marian Stachowicz.

Manjari Yalavarthy, "Distributed Fractal Generation Using Remote Procedure Calls," Plan B, July 1994. Adviser: Gary Shute.

Chaohui Yang, "A Fuzzy Neural Integrated System and Its Applications in Modeling and Control," Plan A, July 1994. Adviser: Marian Stachowicz.

Rajinder Singh, "Document Modification in a Connectionist Retrieval Model," Plan A, August 1994. Adviser: Donald Crouch.

Randy Peterson, "Enhanced Associative Retrieval in a Connectionist Environment," Plan A, December 1994. Adviser: Carolyn Crouch.

Harvinder Bhela, "Monitoring Network Traffic Using SNMP Queries," Plan B, April 1995. Adviser: Gary Shute.

Xiangsheng Xia, "Rectilinear Steiner Minimum Tree Problem," Plan A, July 1995. Adviser: Gary Shute.

David Axtell, "Neural Networks and Quantitative Structure-Activity, Plan A, July 1995. Adviser: Timothy Colburn.

Harry Gehring, "An Interactive Tool to Support the Teaching of Compiler Construction," Plan B, August 1995. Adviser: Donald Crouch.

Nanbo Li, "A Computer Program to Generate Semi-regular Hyberbolic Tessellations," Plan B. August 1995. Adviser: Douglas Dunham.

James Donohoe, "An OSDF/Motif Implementation of a Computer Graphic Program for Generating Repeating Patterns on the Hyperbolic Plane," Plan B, September 1995. Co-advisers: Marian Stachowicz and Douglas Dunham.

Jingwen Wang, "A Hyperbolic Design Program Using the Motif/X11 Interface," Plan B, November 1995. Adviser: Douglas Dunham.

Shiaoling Peng, "Studies of Parallel Programming," Plan B, February 1996. Adviser: Donald B. Crouch.

Pankaj Agrawal, "Non-Uniform Image Processing: Feature Based Image Compression and Sub-Pixel Image Interpolation," Plan A, March 1996. Adviser: Donald B. Crouch.

Haichou Fan, “Adaptive Marching Cubes: A Fast 3D Surface Construction Algorithm,” Plan A, April 1996. Adviser: Douglas Dunham.

Amit Jain, “Adaptive Marching Cubes,” Plan B, April 1996. Adviser: Douglas Dunham.

Rahul Bora, “Information Retrieval and the TREC Database,” Plan B, August 1996. Adviser: Carolyn J. Crouch.

Prathibha Gunaseelan, “Software Tools for a Compiler Project,” Plan B, September, 1996. Adviser: Donald Crouch.

N. R. Vaidyanathan, “Re-engineering MPI for a Multi-Homed Switched Network of Workstations,” Plan B, January 1997. Adviser: Gary Shute.

William Reichelt, “Feature Selection in Neural Networks: An Examination of Three Algorithms,'' Plan B, February 1997. Co-Advisers: Tim Colburn and David Opitz.

Ravi Potluri, “Machine Learning Techniques For Automated Information Filtering,” Plan B, March 1997. Adviser: David Opitz.

Tong Chen, “Using Smart for TREC Research,” Plan B, May 1997. Adviser: Carolyn Crouch.

Ewa Kusmierek, “Synchronization of Java Threads,” Plan A, May 30, 1997. Adviser: Gary Shute.

Yunjiang Luo, “Using Relevance Feedback on TREC,” Plan A, June 1997. Adviser: Carolyn Crouch.

Lei Chen, “Generating Kaleidoscope Patterns in the Hyperbolic Plane,” Plan B, July 1997. Adviser: Douglas Dunham.

Bei Tang, “Decision-Theoretic Algorithms for Clustering Data,” Plan B, September 1997. Adviser: Marion Stachowicz.

Xi (Cissy) Zhang, “A Comparison of Information Retrieval Methods with Machine Learning Approaches,” Plan A, November 1997. Co-advisers: Carolyn Crouch and Richard Maclin.

Xing Li, “Generating Objects in the Hyperbolic Plane,” Plan B, December 1997. Adviser: Douglas Dunham.

Vinod John, “Geometric Transformations of Motifs of Repeating Hyperbolic Patterns,” Plan A, May 1998. Adviser: Douglas Dunham.

Sameer Pradhan, "A Generalized Approach to Computer Science Distance Learning," Plan B, May 1998. Adviser: Donald Crouch.

Xiong Wang, "Generating Improved Queries for the World Wide Web," Plan A, July 1998. Adviser: Carolyn Crouch.

Ramji Pilapakam, "Reinforcement Learning in Multi-Agent Environment," Plan A, July 1998. Adviser: Richard Maclin.

Zhiyu (Sonny) Zhan, "Fuzzy Mathematical Approach to Color Recognition," Plan A, August 1998. Adviser: Marian Stachowicz.

Rahul Naik, "Creating Classification Features for Biological Images," Plan A, September 1998. Adviser: Richard Maclin.

Norman Will, "Using the Web for Interactive Data Acquisition, Presentation and Analysis," Plan B, September 1998. Adviser: Carolyn Crouch.

Gang Wu, "Polygon Area Decomposition with Near-Minimal Perimeter," Plan A, May 1999. Adviser: Donald Crouch

Shakila Xavier, "Learning from Training Samples," Plan A, June 1999. Adviser: Richard Maclin

Christopher Buck, "Applying Persistence to Priority Search Trees to Facilitate Multi-Dimensional Range Queries," Plan A, June 1999. Adviser: Gary Shute

Qingyan Chen, "Improving the Retrieval Effectiveness of Very Short Queries," Plan A, September 1999. Adviser: Carolyn Crouch

Ravi Terala, "Streaming Audio Player in Java," Plan B, January 2000. Adviser: Gary Shute

Jayaraman Manni, "A Study of Object Oriented Design Patterns in the Development of a Framework," Plan A, May 2000. Adviser: Gary Shute

Vishwas Raman, "A High Throughput Computing System with User-Initiated Checkpointing," Plan A, May 2000. Adviser: Richard Maclin

Karthik Ramakrishnan, "Building a Piece-Wise Ensemble of Decision Tree Classifiers," Plan A, May 2000. Adviser: Richard Maclin

Purushottam Kulkarni, "Some Methods for Parallelizing Decision Tree Learning," Plan
A, May 2000. Adviser: Richard Maclin

Ramesh Kizhappali, "Valkyrie: A Distributed System for Graph Visualization," Plan A, June 2000. Adviser: Douglas Dunham

Vidyasagar Krishnamoorthy, "Object Oriented Graph Framework with Searcher," Plan A, June 2000. Adviser: Gary Shute

Haseen Alam, "Multi-channel Image Segmentation," Plan A, December 2000. Adviser: Donald B. Crouch

Hariprasad Bommaganti, "A Novel Feature Subset Selection Approach," Plan A, May 2001. Adviser: Richard Maclin

Gan Chen, "Providing Dynamic Network Information to Distributed Applications," Plan A, May 2001. Adviser: Maria Sosonkina

Xiaochun (Shirley) Liu, "Deterministic Conformant Planning with the Causal Calculator," Plan A, May 2001. Adviser: C. Hudson Turner

Kiranmayee Nakka, "Object-Oriented Graph Framework," Plan A, May 2001. Adviser: Gary Shute

Alark Joshi, "Interactive Visualization of Models of Hyperbolic Geometry," Plan A, June 2001. Adviser: Douglas Dunham

Anand Nagarajan, "Distributed Graph Coloring Algorithms in Linear Systems," Plan A, June 2001. Adviser: Maria Sosonkina

Milton Luoma, "A Realistic Bayes Net for Predicting Type 2 Diabetes," Plan B, June 2001. Adviser: Carolyn Crouch

Steven Holtz, "Further Experiments in Improving Very Short Queries," Plan A, July 2001. Adviser: Carolyn Crouch

Shardul Vikram, "Some Experiments with Reinforcement Learning on Real World Robots," Plan A, September 2001. Adviser: Richard Maclin

Aditi Paluskar, "User-Level Control of Scheduling in a Micro Kernel Operating System," Plan B, December 2001. Adviser: Theodore Pedersen

Kiranmai Kodukula, "Using Artificial Neural Networks to Predict Properties of Polypropylene Film," Plan B, June 2002. Adviser: Timothy Colburn

Devdatta Kulkarni, "Using Dynamic Network Information to Improve the Runtime Performance of a Distributed Sparse Linear System Solution," Plan A, June 2002. Adviser: Masha Sosonkina

Amit Lath, “Approximate Hyperbolic Splines and Their Transformations,” Plan A, June 2002. Adviser: Douglas Dunham

Kristy VanHornweder, “Extending the Application of Partial Order Bounding to Game Tree Search,” Plan A, June 2002. Adviser: Timothy Colburn

Srinivas Vadrevu, “Efficient Neural Network Training Using Subsets of Very Large Datasets,” Plan A, June 2002. Adviser: Richard Maclin

Inderjit Singh, “The Impact of Phrases on the Retrieval Effectiveness of Very Short Queries,” Plan A, August 2002. Adviser: Carolyn Crouch

Zhuo Chen, “Determinizing in Conformant Planning,” Plan A, October 2002. Adviser: C. Hudson Turner

Nirish Dhruv, “Design of Large Scale Data Archival and Retrieval System for Transportation Sensor (Write-Once-Ready-Many Type) Data,” Plan A, October 2002. Adviser: Donald B. Crouch

Abhijit Parsekar, “ A Unified Data Representation and Visualization of Patterns Based on Regular Tessellations in the Three “Classical” Geometries,” Plan A, December 2002. Adviser: Douglas Dunham

Satanjeev Banerjee, “Adapting the Lesk Algorithm for Word Sense Disambiguation to WordNet,” Plan A, December 2002. Adviser: Ted Pedersen

Nitin Varma, “Identifying Word Translations in Parallel Corpora Using Measures of Association,” Plan A, December 2002. Adviser: Ted Pedersen

Deepa Krishnamoorthy, “An Approach to Inclusion of Parallel Independent Sets in PARMS,” Plan A, March 2003. Adviser: Masha Sosonkina

Krishna Kotnana, “Conformant Planning as QBF Satisfiability,” Plan A, August 2003. Adviser: C. Hudson Turner

Sameer Apte, “Using the Extended Vector Space Model for Content-Oriented XML Retrieval,” Plan A, August 2003. Adviser: Carolyn J. Crouch

Harsh Bapat, “Adapting the Extended Vector Space Model for Structured XML Retrieval,” Plan A, August 2003. Adviser: Carolyn J. Crouch

Saif Mohammad, “Combining Lexical and Syntactic Features for Supervised Word Sense Disambiguation,” Plan A, August 2003. Adviser: Ted Pedersen

Siddharth Patwardhan, “Incorporating Dictionary and Corpus Information into a Context Vector Measure of Semantic Relatedness,” Plan A, August 2003. Adviser: Ted Pedersen

Sweta Sinha, "A Finite Domain Satisfiability Solver," Plan A, August 2003. Adviser: C. Hudson Turner

Oleksandr Kosolapov, "The Effects of Category Information on Association Learning Tasks in Neural Network Models," Plan A, October 2003. Adviser: Christopher Prince

Jayanta Nath, "Modeling Behavior Programming Language Design in a Rat Maze Simulator," Plan B, October 2003. Adviser: Christopher Prince

Srikanth Varanasi, "Modeling and Simulating Scenarios for Testing the Effects of Information Technology in the Reduction of Medical Errors," Plan A, November 2003. Adviser: Piotr Windyga

Krishna Chengavalli, "Wearable Computing in the Reduction of Medical Errors Committed by Registered Nurses in the Intensive Care Unit," Plan A, December 2003. Adviser: Piotr Windyga

Anand Sivaraman, "Improving the Efficiency of a Color-Based Image Retrieval System," Plan A, December 2003. Adviser: Donald B. Crouch

Kiran Vuppla, "Evaluation and Documentation of Two Synchrony Detection Implementations," Plan A, April 2004. Adviser: Christopher Prince

Samuel Storie, "Aspects of Communication Subsystem Analysis for Distributed Scientific Applications," Plan A, May 2004. Adviser: Masha Sosonkina

Navdeep Kaur, "Empirical Analysis of Two Learning Techniques for Image Retrieval," Plan A, June 2004. Adviser: Donald B. Crouch

Ruinan Lu, "Parallel Algebraic Recursive Multilevel Solver to Tackle Difficult Sparse Linear Systems of Equations," Plan B, June 2004. Adviser: Masha Sosonkina

Deodatta Bhoite, "A Traffic Data Warehouse and Visualization Scheme," Plan A, July 2004. Adviser: Richard Maclin

Nan Zhang, "Duluth Entertainment Convention Center (DECC) Special Events Traffic Flow Study," Plan A, July 2004. Adviser: Douglas Dunham

Nitin Agarwal, "Extending the Stream Concept," Plan A, August 2004. Adviser: Gary Shute

Yanhua Li, "Hyperbolic Spline Curves Using a Weighted Average," Plan A, August 2004. Adviser: Douglas Dunham

Ashutosh Nagle, "A Finite Domain Satisfiability Solver with Negation," Plan A, August 2004. Adviser: C. Hudson Turner

Prashant Rathi, "Development of Customizable Analytical Model of the Prostrate Anatomy for Training in Cryosurgical Related Procedures and Design of the Virtual Simulator," Plan A, August 2004. Adviser: Douglas Dunham

Rashmi Kankaria, "A Tool for Constructing and Visualizing Tree Augmented Bayesian Networks for Survey Data," Plan A, August 2004. Adviser: Richard Maclin

Amruta Purandare, "Unsupervised Word Sense Discrimination by Clustering Similar Contexts," Plan A, August 2004. Adviser: Ted Pedersen

Anand Takale, "Constructing Predictive Models to Assess the Importance of Variables in Epidemiological Data Using a Genetic Algorithm System Employing Decision Trees," Plan A, August 2004. Adviser: Richard Maclin

Archana Bellamkonda, "Automation of Content and Structure (or CAS) Query Processing," Plan A, September 2004. Adviser: Carolyn Crouch

Aniruddha Mahajan, "Flexible Retrieval in a Structured Environment," Plan A, September 2004. Adviser: Carolyn Crouch

Kailash Aurangabadkar, "Generating Subnets for Polyhedra," Plan A, October 2004. Adviser: Douglas Dunham

Sachin Sharma, "Object Retrieval Based on Color Composition," Plan A, October 2004. Adviser: Donald B. Crouch

Suchitra Goopy, "Improving Usability of the Parallel Algebraic Recursive Multilevel Solver," Plan B, December 2004. Adviser: Masha Sosonkina

Anushri Parsekar, "Blind Deconvolution of Vehicle Inductive Signatures for Travel Time Estimation," Plan A, December 2004. Adviser: Donald B. Crouch

Bridget Thomson-McInnes, "Extending the Log Likelihood Measure to Improve Collocation Identification," Plan A, December 2004. Adviser: Ted Pedersen

Paul Gordon, "Using NICAN for the Monitoring and Reporting of Environmental Conditions on Multiple Nodes during the Execution of the Parallel Program GAMESS," Plan B, May 2005. Adviser: Masha Sosonkina

Sumalatha Kuthadi, "Detection of Objects from High-Resolution Satellite Images," Plan A, May 2005. Adviser: Douglas Dunham

Archna Yadav, "A State Space Approach to Arterial Travel Time Prediction," Plan B, May 2005. Adviser: Carolyn Crouch

Ajit Datar, "Generating Hyperbolic Patterns for Regular and Non-Regular P-Gons," Plan A, July 2005. Adviser: Douglas Dunham

Jason Michelizzi, "Semantic Relatedness Applied to All Words Sense Disambiguation," Plan A, July 2005. Adviser: Ted Pedersen

Pratheepan Raveendranathan, "Identifying Sets of Related Words on the World Wide Web," Plan A, July 2005. Adviser: Ted Pedersen

Nagendra Doddapaneni, "Effective Structured Query Processing," Plan A, August 2005. Adviser: Carolyn J. Crouch

Hemal Lal, "A Finite Domain Satisfiability Solver with Clause Leaning and Non-Chronological Backtracking," Plan A, August 2005. Adviser: C. Hudson Turner

Sampanna Salunke, "Comparing Synchrony Detection Algorithms for Robotic Self-other Discrimination," Plan A, August 2005. Adviser: Christopher Prince

Ravindra Bharadia, "A Program to Display Semi-Regular Tessellations of Hyperbolic Plane," Plan B, September 2005. Adviser: Douglas Dunham

Tarun Kapoor, "Generating Repeating Hyperbolic Patterns Based on {p,∞}," Plan A, September 2005. Adviser: Douglas Dunham

Sudip Khanna, "Design and Implementation of a Flexible Retrieval System," Plan A, September 2005. Adviser: Carolyn J. Crouch

Poorva Potnis, "Relevance Feedback in Flexible Retrieval System," Plan A, September 2005. Adviser: Carolyn J. Crouch

Anoop Parlapalli Reddy, "Analysis of Synchronous and Asynchronous Video Using the SenseStream Program," Plan B, March 2006. Adviser: Christopher Prince

David Wicklund, "Making the Most of SQL Views," Plan B, July 2006. Adviser: Carolyn J. Crouch

Sameer Atar, "Generating Repeating Patterns on Subnets of Polyhedra," Plan A, July 2006. Adviser: Douglas Dunham

Kedar Bhumkar, "Interactive Visualization of Hyperbolic Geometry using the Weierstrass Model," Plan A, July 2006. Adviser: Douglas Dunham

Saiyam Kohli, "Introducing an Object Oriented Design to the Ngram Statistics Package," Plan B, July 2006. Adviser: Ted Pedersen

Anagha Kulkarni, "Unsupervised Context Discrimination and Automatic Cluster Stopping," Plan A, July 2006. Adviser: Ted Pedersen

Aditya Polumetla, "Machine Learning Methods for the Detection of RWIS Sensor Malfunctions," Plan A, July 2006. Adviser: Richard Maclin

Kai Xu, "Deciding Strong Equivalence of Causal Theories," Plan B, July 2006. Adviser: C. Hudson Turner

Vishal Bakshi, "Flexible Retrieval for the Semi-Structured Documents," Plan A, August 2006. Adviser: Carolyn J. Crouch

Satyanarayana Murthy Ganapathibhotla, "Query Processing in a Flexible Retrieval Environment," Plan A, August 2006. Adviser: Carolyn J. Crouch

Mahesh Joshi, "Kernel Methods for Word Sense Disambiguation and Abbreviation Expansion in the Medical Domain," Plan A, August 2006. Adviser: Richard Maclin

Apurva Padhye, "Comparing Supervised and Unsupervised Classification of Messages in the Enron Email Corpus," Plan A, August 2006. Adviser: Ted Pedersen

Lalit Nookala, "Weather Impact on Traffic Conditions and Travel Time," Plan A, October 2006. Adviser: Donald B. Crouch

Umesh Maitipe, "Using Programmable Graphics Hardware for Real Time Tree Animation with Simulated Wind Patterns," Plan A, July 2007. Adviser: Pete Willemsen

Aditya Mone, "Dynamic Element Retrieval for the Semi-Structured Documents," Plan A, July 2007. Adviser: Carolyn J. Crouch

Neeraj Vohra, "An Investigation: Using Lemur to Feed Flex," Plan B, July 2007. Adviser: Carolyn J. Crouch

Nachiket Kamat, "Impact of Untagged Text in Dynamic Element Retrieval," Plan A, August 2007. Adviser: Carolyn J. Crouch

Vikram Malik, "Impact of Terminal Node Processing on Element Retrieval," Plan A, August 2007. Adviser: Carolyn J. Crouch

Ajit Marathe, "Incorporating Points at Infinity in a Hyperbolic Drawing Program," Plan A, August 2007. Adviser: Douglas Dunham

Vinayak Patil, "Tile Coding Reinforcement Learning for RoboCup Soccer," Plan B, August 2007. Adviser: Richard Maclin

Amine Abou-Rjeili, "Solving Conformant Planning Using Chen's Determinizing Method," Plan A, May 2008. Adviser: C. Hudson Turner

Anagha Dharasurkar, "Further Evaluation of the Gogate el al Synchrony Measurement Algorithm," Plan B, June 2008. Adviser: Christopher Prince

Andrew Norgren, "GPU Based Particle Dispersion Modeling with Interactive Visualization Support for Real-time Simulation," Plan A, June 2008. Adviser: Peter Willemsen

Darshan Paranjape, "Improving Focused Retrieval," Plan A, July 2008. Adviser: Donald B. Crouch

Salil Bapat, "Improving Results for Focuses and Relevance-in-Context Tasks," Plan A, August 2008. Adviser: Carolyn J. Crouch.

Prafulla Bhalekar, "A Web-Based System to Assist in Detecting RWIS Sensor Malfunctions," Plan A, August 2008. Adviser: Richard Maclin

Sarika Mehta, "Finding the Best Entry Point," Plan A, August 2008. Adviser: Carolyn J. Crouch

Aneerudh Naik, "Impact of Slope and Pivot Values on Dynamic Element Retrieval," Plan B, August 2008. Adviser: Carolyn J. Crouch

Ankur Nepalia, "Creating Repeating Patterns on Polyhedra," Plan A, August 2008. Adviser: Douglas Dunham

Shruti Pandey, "Methods for Approximating Forward Selection of Features in Information Retrieval Problems Using Machine Learning Methods," Plan A, August 2008. Adviser: Richard Maclin

Premchand Bellamkonda, "Rapid Simulation of the Great Depression 1929-1932," Plan B, September 2008. Adviser: Donald B. Crouch

Anurag Jain, "Watched Literals in a Finite Domain SAT Solver," Plan A, September 2008. Adviser: C. Hudson Turner

Vishnu Pedireddi, "Large Scale Behavior Simulation on Graphics Processing Unit in Virtual Environments," Plan A, September 2008. Adviser: Pete Willemsen

Bin Lan, "Grounder for Finite Domain SAT," Plan B, June 2009. Adviser: Hudson Turner

Prasad Kulkarni, "Simulating Wing-Sensors on a Sailplane Airfoil to Evaluate Usefulness for Pilot Feedback," Plan A, July 2009. Adviser: Christopher Prince

Varun Sudhakar, "Improving Results for the Best in Context Task," Plan B, July 2009. Adviser: Donald B. Crouch

Dinesh Bhirud, "Focused Retrieval Using Upper Bound Methodology," Plan A, August 2009. Adviser: Carolyn J. Crouch

Siddharth Deokar, "Real-Time Snow Rendering," Plan A, August 2009. Adviser: Peter Willemsen

Varada Kolhatkar, "An Extended Analysis of a Method of AllWords Sense Disambiguation," Plan A, August 2009. Adviser: Ted Pedersen

Atul Kulkarni, "A Nearest Neighbor Approach Using Clustering on the Netflix Prize Data," Plan B, August 2009. Adviser: Richard Maclin

Andrew Larson, "DVPDS: An Open Source Data Analysis and Visual Programming Tool for Database Statistics," Plan A, August 2009. Co-Advisers: Richard Maclin and Peter Willemsen

Chaitanya Polumetla, "Improving Results for the Relevant in Context Task," Plan A, August 2009. Adviser: Carolyn J. Crouch

Pavan Poluri, "Focused Retrieval Using Exact Methodology," Plan A, August 2009. Adviser: Donald B. Crouch

Sathavahana Bhogapathi, "My Experiences with MPI," Plan B, August 2010. Adviser: Pete Willemsen

Ramakrishna Cherukuri, "Significance Testing for INEX 2008-09 Ad Hoc Track," Plan A, August 2010. Adviser: Carolyn Crouch

Vivek Kasireddy, "A Biclustering Method for Extracting Keyphases to Describe Groups of Yeast Genes," Plan A, August 2010. Adviser: Richard Maclin

Abhijeet Mahule, "Improving Results for the INEX Thorough Task," Plan A, August 2010. Adviser: Carolyn Crouch

Michael Neilsen, "AIRS An Architecture for Interactive Real-time Systems," Plan A, August 2010. Adviser: Pete Willemsen

Dipesh Pandey, "Re-Engineering a Repeated Hyperbolic Pattern Program to Include Color Symmetry," Plan B, August 2010. Adviser: Douglas Dunham

Sridhar Uppala, "Experiments with Weighting Schemes in SMART," Plan B, August 2010. Adviser: Donald B. Crouch

Sandeep Vadlamudi, "Producing Improved Results for the INEX Focused and Relevant in Context Tasks," Plan A, August 2010. Adviser: Donald B. Crouch

Sunil Vejandla, "Branch Prediction," Plan B, August 2010. Adviser: Gary Shute

Anand Janjal, "Register Renaming," Plan B, September 2010. Adviser: Gary Shute

Natasha Deepak Acquilla, “Improving Results for the 2009 and 2010 INEX Focused Tasks,” Plan A, August 2011. Adviser: Carolyn J. Crouch

Radhika A. Banhatti, “Improving Results for the INEX 2009 Thorough and 2010 Efficiency Tasks,” Plan A, August 2011. Adviser: Donald B. Crouch

Bhagyashri Abhijeet Mahule, “A User Guide for Flex,” Plan A, August 2011. Adviser: Carolyn J. Crouch

Reena Rachel Narendravarapu, “Improving Results for the INEX 2009 and 2010 Relevant in Context Tasks,” Plan A, August 2011. Adviser: Donald B. Crouch

Dnyaneshwari Chandarana, “Designing an Algorithm That Transforms Each Pixel Back to Motif in a Fundamental Region,” Plan A, September 2011. Adviser: Douglas Dunham

Lakshmi Ramya Pathi, “Covering Polyhedra by Motifs with Triangular Fundamental Regions,” Plan A, September 2011. Adviser: Douglas Dunham

7. RELATED POLICIES AND INFORMATION

7.1 Mutual Responsibilities in Graduate Education at the University of Minnesota

Preamble

A major purpose of graduate education at the University of Minnesota is to instill in each student an understanding of and capacity for scholarship, independent judgment, academic rigor, and intellectual honesty. Graduate education is an opportunity for the student to develop into a professional scholar. Graduate research and teaching assistantships offer an "apprenticeship" experience in the academic profession as well as financial support. It is the joint responsibility of faculty and graduate students to work together to foster these ends through relationships that encourage freedom of inquiry, demonstrate personal and professional integrity, and foster mutual respect. This shared responsibility with faculty extends to all of the endeavors of graduate students, as students, employee, and members of the larger academic community.

High quality graduate education depends on the professional and ethical conduct of the participants. Faculty and graduate students have complementary responsibilities in the maintenance of academic standards and the creation of high quality graduate programs. Excellence in graduate education is achieved when both faculty and students are highly motivated, possess the academic and professional backgrounds necessary to perform at the highest level, and are sincere in their desire to see each other succeed.

The following principles illustrate what students should expect from their programs and what programs should expect from their students, to help achieve this excellence.

Principle 1: Information about Policies and Procedures.

The Graduate School and graduate programs are responsible for providing students and prospective student with access to information about their graduate program, areas of specialization, degree requirements, and average time to completion of degrees. Graduate programs are responsible for providing access to information about graduate student financial support in the program, such as the prospects for fellowships, assistantships or other financial support and the proportion of students receiving financial support. In addition, graduate programs should provide students and applicants with information about career experiences of graduates of the program. All such information should be presented in a format that does not violate the privacy of individual students. Programs are encouraged to provide relevant information in their handbooks, websites or other readily accessible formats.

Students are responsible for keeping themselves informed about current policies of their program and the Graduate School that affect graduate students. Students and alumni also have a responsibility to respond to program inquiries about their career development.

Principle 2: Communication about Academic Status

The Graduate School and graduate programs are responsible for providing students with information about their individual academic status: who in the Graduate School and in their graduate program is responsible for communicating to them about admission issues and progress through the degree program, how the communication will take place, and the possibility for appeal to a third party for assistance in solving disputed issues.

Students are responsible for communicating with the Graduate School and their graduate program about changes in their circumstances that affect their status and progress toward the degree.

Principle 3: Research Contributions

Individual faculty as research directors are responsible for providing students with appropriate recognition for their contributions at conferences, in professional publications, or in applications for patents. It is the faculty member's responsibility to clarify the principles for determining authorship and recognition at the beginning of any project.

Students are responsible for discussing their expectations regarding acknowledgment of research contributions or intellectual property rights with the appropriate person(s) in the research team, preferably early in the project.

Principle 4: University Governance

Departments and graduate programs are responsible for defining specific opportunities for student participation on committees as they deem appropriate. The University recognizes that graduate students make important contributions to governance and decision making at the program, department, college, Graduate School and University level; specific roles for participation are defined at each level by the relevant governing bodies. For example, University Senate policy requires student membership on faculty search committees.

Students are responsible for participating in University governance and decision making that enriches the campus community.

Principle 5: Respectful Employment Conditions

University faculty and staff are responsible for assuring that graduate students are able to conduct their work, as students or students/employees, in a manner consistent with professional conduct and integrity, free of intimidation or coercion. Students who are employees also have the protection of all University employment policies and laws. Graduate programs are responsible for providing clear communication to students about the possibility for appeal to a third party for assistance in resolving disputed issues.

Students are responsible for reporting unprofessional conduct to the appropriate body or person, as defined in the academic or employment grievance policy; they should be able to do so without fear of reprisal. Students are responsible for acting in a respectful and fair manner toward other students, faculty, or staff in the conduct of their academic work or work they may do in connection with an assistantship.

Principle 6: Conditions of Employment

The University (through its departments, research projects or other employing units) is responsible for providing to prospective graduate assistants a written offer of financial support before a response to the offer is required. Such communication must indicate their salary and the terms and conditions of their appointment, including the general nature of the work they will be performing, duration of employment, and whether and how this employment is tied to their academic progress. The details of specific teaching or research assignments may need to await later written clarification.

Students are responsible for accepting the conditions of employment only if they believe they are qualified and able to complete the tasks assigned. Students have a responsibility for communicating in writing any changes in their circumstances that affect their ability to fulfill the terms and conditions of their employment.

Principle 7: Safe Working Environment

Supervisors are responsible for providing a safe working environment for graduate students, and for developing and publicizing safety policies and training programs to achieve that goal.

Graduate students are responsible for helping to maintain a safe working environment, for adhering to safety policies, for participating in training programs and for reporting safety violations to the proper authority.

7.2 Resolution of the Council of Graduate Schools in the United States

Acceptance of an offer of financial aid (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by an enrolled or prospective graduate student completes an agreement that both student and graduate school expect to honor. When a student accepts an offer before April 15 and subsequently desires to withdraw, the student may submit a written resignation for the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment was made. Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to this resolution that a copy of the resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.

7.3 Other University Documents may provide information and guidance relevant to the graduate education experience:

* Board of Regents, Code of Conduct, adopted 7/12/96
  [www.regents.umn.edu/policies/academic/Conduct.pdf]
* Board of Regents, Academic Freedom and Responsibility, adopted 9/8/95
  [www.regents.umn.edu/policies/academic/AcademicFreedom.pdf]
* Graduate Assistant Office, Handbook for Graduate Assistants
  [www.umn.edu/OHR/GAO/]
* Policy on the Appropriate Use of Information Technology
(www.d.umn.edu/itss/policies/appuse.html)
* University Senate, minutes, April 19, 1990, Student Conduct Code
  [Gopher: U of M Campus Information/ Information for Students/Student Conduct Code]
* Standards of Student Conduct Enforceable by University Agencies
  [www.sja.umn.edu/conduct.html]
* Expectations of Graduate Students in Research, Scholarship, and Professional Education
  [www.grad.umn.edu/Ethics/ethics_brochure.html]
* Research Involving Human Subjects
  [www.research.umn.edu/subjects]
* Research Involving Animal Subjects
  [www.reseach.umn.edu/subjects
* Work-Related Policies (inquires directed to Graduate Assistantship Office and/or Human Resources)
  [www1.umn.edu/ohr/gao]