Graduate Advising Handbook

Department of Computer Science 2012-2013

This handbook represents our best efforts to provide accurate information, but all information contained in this document is subject to change.

Rochester Institute of Technology
B. Thomas Golisano College of Computing and Information Sciences
Department of Computer Science
GOL, Room 3005

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Computer Science MS Program of Study
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Introduction

The Master of Science (MS) degree program in Computer Science at RIT consists of a core curriculum, a wide variety of clusters and many additional electives. The core provides students with a solid background in the theoretical principles underlying computer science, which ensures that graduates acquire the intellectual tools necessary to keep up-to-date in this rapidly evolving discipline. The clusters provide students with the opportunity to obtain depth in a computer science discipline while electives add the necessary breadth of knowledge required for success in industry. This combination of coursework prepares our graduates to engineer modern computing systems and to contribute to all aspects of the systems' life cycles. They can also prepare for academic or research careers in Computer Science or a related discipline as well as further academic study.

Clusters are offered in a variety of areas, such as Computational Vision and Acoustics, Computer Graphics and Visualization, Data Management, Distributed Systems, Intelligent Systems, Languages and Tools, Security and Theory. In some cases, pre-approved graduate courses from other departments may also be counted toward the degree. A complete list of clusters can be found later in this handbook.

This program is designed for students who have an undergraduate major or minor in computer science as well for those who have a strong background in a field in which computers are applied, such as Engineering, Science, Mathematics or Business. In some cases students will be required to complete certain bridge courses to ensure that they meet the prerequisites of the program.

Faculty members in the department are actively engaged in research in the areas of artificial intelligence, computational combinatorics, complexity theory, computer graphics and visualization, computer vision, distributed computing systems, machine learning, and security. There are opportunities for graduate students to participate in these activities for thesis or project work, independent study, graduate assistantships, and consulting. The Center for Advancing the Study of CyberInfrastructure, CASCI, provides additional opportunities for students to participate in research activities.

Related MS Programs at RIT Relating to Computing:

- Computer Engineering (College of Engineering)
- Information Technology (College of Computing and Information Sciences)
- Software Development & Management (College of Computing and Information Sciences)
- Game Design and Development (College of Computing and Information Sciences)
- Computing Security and Information Assurance (College of Computing and Information Sciences)
- Software Engineering (College of Computing and Information Sciences)
- Learning and Knowledge Management Systems (College of Computing and Information Sciences)
- Networking and Systems Administration (College of Computing and Information Sciences)

General Information

Applications for admission are processed throughout the year, and graduate students may generally begin their programs of study in any of the four academic quarters. Students that require bridge courses may be required to start their studies in the Fall or Winter quarter. Course offerings are limited during the summer quarter. Students should contact the Computer Science Department if they plan to start their studies during the spring quarter. There is not a specific deadline for applications, but the number of students accepted each quarter is limited. It is advantageous for students to apply early. Application forms may be obtained online or by writing to:
Entrance Requirements

Undergraduate Degree

The applicant should have a baccalaureate degree from an accredited institution and have a cumulative grade-point average of 3.0 (“B”) or above. Students from institutions that do not use the GPA scale are expected to demonstrate an equivalent level of academic accomplishment. Knowledge of Computer Science and a strong foundation in mathematics are a plus.

Bridge Courses

These courses are designed to assist students in meeting the Computer Science and Mathematics prerequisites in the MS in Computer Science program. There is more information regarding bridge courses later in this handbook.

Transfer Credits

A student may propose to transfer into the MS in Computer Science program up to eight graduate quarter credits that were taken at another university with a grade of ‘B’ or better. Courses must have been taken within the past two years. The Graduate Coordinator will evaluate these proposals. Official transcripts must be sent to:

Graduate Enrollment Services
Rochester Institute of Technology
Bausch & Lomb Center
58 Lomb Memorial Drive
Rochester, New York
14623-5604
gradinfo@rit.edu
http://www.rit.edu

GRE Scores

GRE scores are required from applicants whose undergraduate degrees are from foreign colleges. Other applicants may wish to include GRE scores to enhance their applications (e.g., when undergraduate GPA is less than 3.0). Official test results must be submitted to:

Graduate Enrollment Services
Rochester Institute of Technology
Bausch & Lomb Center
58 Lomb Memorial Drive
Rochester, New York
14623-5604
gradinfo@rit.edu
http://www.rit.edu
TOEFL Scores

The Test of English as a Foreign Language (TOEFL) score is required for every applicant for whom English is not his or her native language. A score of at least 550 on the paper-based test or 213 on the computer-based test is required or 88 on the internet-based test. Exceptions can be made for an applicant whose academic record is strong. Upon arrival at RIT, students whose native language is not English may be required to take the Michigan English Test and follow the recommendations of RIT’s English Language Center.

Financial Aid and Employment Opportunities

Costs

Information on tuition, registration student services, etc. can be found online at http://www.rit.edu/grad. RIT offers various forms of financial aid for graduate students.

The Computer Science department awards partial tuition merit scholarships each year. Merit scholarships are based on the applicant’s application, including grades, courses taken, university attended, and letters of recommendation and GRE scores. The Computer Science Department currently employs nine graduate students as Graduate Assistants. Assistantships offer a 75% scholarship and provide an hourly wage based on 20 hours of work. We require very specific skills for these assignments as well as in-person interviews. We make Graduate Assistantship assignments throughout the academic year for the following September, although openings may unexpectedly occur. If you wish to be considered for an assistantship, please make sure that we have received your full application by March 1st of the preceding school year if you are applying for Fall admission.

- Qualified graduate students may apply to be lab assistants and graders.
- A student can earn money each quarter by working on campus. For more information visit the Office of Student Employment located in room 1350 in the University Services Center (USC), 585-475-2631 or visit http://www.rit.edu/emcs/seo.

Curriculum

The graduate program of study consists of 45 credits. There are two tracks to the degree, the thesis track and the project track.

The Core Courses:

- 4005-800 Theory of Computer Algorithms (4 credits)
- 4005-893 Project/Thesis Seminar (2 credits)

The Thesis Track:

- Four courses from a cluster (16 credits)
- Four electives (16 credits)
- Master’s Thesis (7 credits)

The Project Track:

- Four courses from a cluster (16 credits)
- Five electives (20 credits)
- Master’s Project (3 credits)
The topic of the project or thesis must come from the cluster the student has chosen. **Only the Graduate Coordinator can approve an exception to this rule.** For either track, students with a strong background in a core area may receive permission from the Graduate Coordinator to replace a core course with another course, generally in the same area. Only the Graduate Coordinator can approve changes of a student’s program of study.

Any grade lower than “C” is considered failing. If a student receives a “D” or “F” they should meet with the graduate advisor as soon as possible to discuss the repercussions and create a recovery plan.

**Redundant CS Courses**

Within the Computer Science BS/MS degree there are certain courses that are considered redundant. If you take an undergraduate elective course such as 4003-570, Computer Graphics, you cannot take 4005-761, at the grad level. Additionally, since 4005-800 is required at the graduate level a BS/MS student cannot take 4003-515, Analysis Of Algorithms.

**Clusters and Electives**

The following clusters are available:

- Computational Vision and Acoustics
- Computer Graphics and Visualization
- Data Management
- Distributed Systems
- Intelligent Systems
- Languages and Tools
- Security
- Theory

In addition, a student is allowed to design his/her own cluster, with the consent of a faculty advisor and the graduate coordinator. In the course lists that follow for each cluster, those that are labeled “required” are courses that the students who choose that cluster are required to take. Again, it is understood that each cluster contains options for independent study or heretofore unnamed special topics courses. You may find more information at [www.cs.rit.edu/programs/grad/Clusters](http://www.cs.rit.edu/programs/grad/Clusters).

**Computational Vision and Acoustics**

Computational Vision and Acoustics is concerned with both the acquisition and processing of visual and acoustical information. A scene can be analyzed in both the visual and acoustic domains. Computer vision involves creating algorithms that extract knowledge from the visual domain whereas acoustical analysis involves extracting information from both speech and non-speech sources. By choosing different combinations of courses students can obtain an in depth understanding of the computer science domain of scene analysis.

The following list is a subset of the courses offered in this cluster:

- 4005-750 Introduction to Artificial Intelligence
- 4005-753 Biologically Inspired Intelligent Systems
- 4005-755 Neural Networks and Machine Learning
- 4005-756 Genetic Algorithms
- 4005-757 Intro to Computer Vision (required)*
- 4005-758 Advanced Computer Vision
- 4005-774 Image Understanding
- 4005-775 Introduction to Data Mining
1051-782 Digital Image Processing
1051-784 Digital Image Processing: Spatial Pattern Recognition (Center for Imaging Science)

**Computer Graphics and Visualization**

The Graphics and Visualization Cluster provides the technical foundations for graduate studies in Computer Graphics and Image Understanding. Areas for further study include Graphics Programming, Rendering and Image Synthesis, Computer Animation and Virtual Reality, Image Processing and Analysis, and Data Visualization.

The following list is a subset of the courses offered in this cluster:

- 4005-757 Introduction to Computer Vision
- 4005-758 Advanced Computer Vision
- 4005-761 Computer Graphics I (required)*
- 4005-762 Computer Graphics II
- 4005-763 Computer Animation: Algorithms and Techniques
- 4005-764 Procedural Shading
- 4005-782 Introduction to Digital Image Processing
- 1050-702 Applied Colormetry (Color Science)

**Data Management**

Students in the Data Management Cluster study foundational data management and knowledge discovery challenges prevalent in design, analysis and organization of data. The courses cover general database issues, including database design, database theory, data management and data mining. By choosing different combinations of courses, students can gain a broad understanding of theory, research and practices of the management systems.

The following list is a subset of the courses offered in this cluster:

- 0307-702 Statistics for Data Mining (required)*
- 4005-771 Database Systems (required)*
- 4005-772 Database System Implementation I (as per RKR)
- 4005-773 Data Cleaning and Preparation
- 4005-774 Secure Database Systems
- 4005-775 Data Mining
- 4005-779 Topics in Data Management (different seminars offered under this number)

**Distributed Systems**

The Distributed Systems Cluster focuses on systems formed from multiple cooperating computers. Courses cover the analysis, design, and implementation of distributed systems, distributed middleware, and computer networking protocols, including security. By choosing different combinations of courses students can gain a broad understanding of the distributed systems field, concentrate on the high level distributed application aspects, or concentrate on low level networking aspects.

The following list is a subset of the courses offered in this cluster:

- 4005-705 Cryptography
- 4005-706 Cryptography II
- 4005-730 Distributed Systems I (required)*
- 4005-735 Parallel Computing I
- 4005-736 Parallel Computing II
- 4005-739 Topics in Operating Systems
- 4005-740 Data Communications and Networks I (required)*
Intelligent Systems

Intelligent Systems encompasses the study of algorithms that enable software systems to make decisions in complex environments, for areas ranging from learning to knowledge representation and automated inference. A diverse range of fields, from philosophy to cognitive science, inspires the creation of algorithms for the applications of tomorrow.

The following list is a subset of the courses offered in this cluster:

4005-747 Intelligent Security Systems (Seminar)
4005-750 Intro to AI (required)*
4005-753 Biologically Inspired Intelligent Systems
4005-755 Neural Networks & Machine Learning
4005-756 Genetic Algorithms
4005-757 Intro to Computer Vision
4005-758 Advanced Computer Vision
4005-759 Pattern Recognition (Seminar)
4005-759 Mobile Robot Programming (Seminar)
4005-774 Image Understanding
4005-775 Data Mining

Languages and Tools

The Languages and Tools cluster clusters language design and implementation together with architecture and use of software development tools. By choosing different combinations of courses students can gain a broad understanding of theoretical and applied knowledge.

The following list is a subset of the courses offered in this cluster:

4005-710 Programming Language Theory
4005-711 Compiler Construction (required)*
4005-713 XML
4005-714 Programming Skills
4005-715 Language Based Security
4005-716 Software Development Tools (required)*
4005-719 Topics in Programming Languages (Seminar)

Security

The Security cluster spans from networking to cryptography to secure databases. By choosing different combinations of courses students can gain a broad understanding of theoretical and applied knowledge.

The following list is a subset of the courses offered in this cluster:

4005-705 Cryptography I (required)*
4005-706 Cryptography II
4005-740 Data Communications and Networks I (required)*
4005-742 Ad Hoc Networking
4005-746 Security, Measurement, and Testing
4005-747 Intelligent Security Systems
4005-774 Secure Database Systems
4005-784 Privacy and Security
4005-785 Secure Coding

Theory

The Theory cluster studies the fundamentals of computation. These fundamentals include complexity theory to determine the inherent limits of computation and communication and cryptography and the design and analysis of algorithms to obtain optimal solutions within those limits.

The following list is a subset of the courses offered in this cluster:

4005-701 Computability
4005-702 Complexity
4005-704 Complexity and Computability
4005-705 Cryptography
4005-706 Cryptography II
4005-709 Combinatorial Computing (Seminar)
4005-709 Extreme Theory (Seminar)
4005-755 Neural Networks & Machine Learning

*If you took this equivalent CS course at the undergraduate level, this course is not required at the graduate level, and in fact you cannot take this course again for credit.

Approved Electives

The following electives are approved courses of the Computer Science curriculum, which do not necessarily belong to a cluster. Although this list has been established, the Graduate Coordinator must approve all courses taken from outside the Computer Science Department. Programming or computing courses offered by other departments are not necessarily acceptable. Other departments’ courses are primarily for their own majors, and may have prerequisites, which

PhD Program Courses

4040-820 Discovery
4040-830 Connectivity
4040-840 Security and Trust
4040-850 Design
4040-896 CyberInfrastructure Colloquium

Computer Engineering

0306-722 Advanced Computer Architecture
0306-756 Multiple Processor Systems
0306-758 Fault Tolerant Digital Systems
0306-761 Engineering Design of Software

Mathematics

1016-712 Numerical Linear Algebra
1016-725 Stochastic Processes
1016-764 Topics in Logic, Sets, and Computability
1016-802 Methods of Applied Mathematics
BS/MS Program

The BS/MS program is for outstanding undergraduate students who wish to immediately continue their studies in Computer Science at the Master's degree level. The BS/MS program in Computer Science offers students an opportunity to receive their MS degree in approximately one additional year after completing their BS degree. A student who is accepted into the BS/MS program will be able to take two graduate courses (8 quarter hours) in Computer Science and apply them to both the BS and MS degree requirements. There can be significant financial benefits to students who enroll in this program, although these are best discussed with your financial aid counselor.

A student will not receive their Bachelor's degree until the requirements for both Bachelor's and Master's degrees have been completed. As a general rule, students are strongly encouraged to complete all of their BS requirements before entering the MS program. BS/MS students who have not fulfilled their undergraduate requirements will be admitted in the MS program. Nevertheless students in the BS/MS program cannot register for a project or a thesis, if they have not fulfilled all of their undergraduate requirements, including co-op.

Computer Science Independent Study

Students have a limited opportunity to obtain credit for independent study and to use that credit to meet degree requirements. Generally, independent study projects represent work that is different from, or an extension of, existing course offerings. In order to take an independent study, students must have a faculty sponsor. The faculty sponsor has to be a member of the CS faculty or GCCIS Ph.D. core faculty. Students and that faculty sponsor will fill out the Independent Study form to decide what they will do and how students will be graded. Students and the faculty sponsor must also sign the Independent Study form and the Graduate Coordinator must approve it before the student is allowed to register for an Independent Study course. After the student's work is complete, they are required to submit a report of their work to the sponsor of their independent study. The expected amount of time spent for a 4 credit hour independent study is equivalent to a 4 credit hour lecture. A detailed report describing the completed work has to be handed in to the faculty sponsor. A typical report has about 30 pages. You can apply at most eight (8) quarter hours of Independent Study toward your MS degree in Computer Science.

Cooperative Education

Graduate students are eligible for co-op work consisting of four blocks/quarters of full-time employment. A co-op position is not assured. The co-op program is available for full-time students in good standing (cumulative GPA of 3.0 or better or a quarterly GPA of 3.0 or better in the quarter immediately preceding the requested co-op quarter) who have completed the Bridge Program and at least 16 credits of the MS program of study.

Co-op positions must be secured by the beginning of the academic term that you wish to co-op. Permission for mid-quarter co-ops will not be granted.

To register for co-op, you must participate in “Co-op Orientation”. Information may be obtained from Annette Stewart @ 585-475-5466, aksocce@rit.edu in the Co-op and Career Services Office. Please visit http://www.rit.edu/~964www.
**Probation and Suspension**

Any matriculated graduate student whose Program Grade Point Average falls below a 3.0 (B average) after 12 quarter credit hours or subsequently will be placed on probation and counseled by the departmental advisor concerning continuation in the graduate program. Those students placed on probation must raise their Program Cumulative GPA to the 3.0 level within 24 quarter credit hours or risk suspension from the graduate program. Should it be necessary to suspend a graduate student for academic reasons, the student may apply for readmission to the dean of the college or designee (department head, program director, coordinator, etc.) upon demonstration of adequate reason for readmission. Re-admission is **not** guaranteed.

**Master Thesis or Project**

The capstone of the master’s program is either a thesis or project. Before registering for Thesis or Project the student must take the MS Project/Thesis Seminar. The purpose of the seminar is to develop an idea for the student’s project or thesis, form a committee and develop a pre-proposal. After successfully completing these tasks the student should further develop the pre-proposal into an actual Proposal and get it signed by their committee. The student can then bring the Proposal to the CS department and register for his/her Thesis or Project. All students must present their pre-proposal in MS Project/Thesis Seminar before his/her committee can sign off on the Proposal. It is expected that the student will work with the chair of their committee while he/she is developing the Proposal. You will find more details on Thesis and Project later in this document.

**The Bridge Program**

Students who we deem require additional exposure to Computer Science or Mathematics course work in order to be successful in graduate level CS course work will be assigned courses from the Bridge Program. Bridge courses will be noted on your Program of Study.

Students who require Bridge Courses are "conditionally" admitted to the MS program and are required to successfully complete all assigned bridge courses in addition to the 45 credits constituting the MS program. Each bridge course must be passed with a grade of ‘B’ or better. If you repeat a Bridge Course more than once without achieving at least a grade of ‘B’, you will not be admitted into the MS program. The Graduate Coordinator may waive bridge courses if the student passes the related bridge course exam given during Orientation the first quarter the student is admitted. Exams in each subject area can only be taken once during orientation. The decision of the Graduate Coordinator is final. Graduate students will be charged graduate tuition for any courses they take at RIT. This includes all bridge courses – even if they are at the undergraduate level.

**Computer Programming**

This generally consists of a sequence of three courses. The Computer Science MS program involves a large amount of computer programming. Students need to be proficient in a modern, object-oriented programming language, specifically Java and C++. The first course is an advanced course in Java, covering Java basics, threads, collection frame work, and network programming.

The second course focuses on the C++ programming language and design. Topics cover the basic syntax language, how it supports the object-oriented programming paradigm, templates and input/output. The second part of the course explores advanced data structures such as graphs and B-trees.

The third course focuses on the theory of computation including formal languages, grammars, automata theory, computability, and complexity.
Typical Courses from the RIT Computer Science Department:

4003-700 Foundations of Computer Theory
4003-703 Advanced C++ and Program Design
4003-707 Advanced Java Programming

Operating Systems

One course in the principles and fundamental algorithms for operating systems is usually adequate preparation. It is not sufficient to simply be able to program in one or more environments.

Typical course from the RIT Computer Science Department:

4003-713 Operating Systems

Calculus

We require a standard, one-year sequence in differential and integral calculus.

Suggested courses from the RIT Mathematics Department:

1016-281 Project-Based Calculus 1
1016-282 Project-Based Calculus 2
1016-283 Project-Based Calculus 3

Probability Theory

This should be a calculus-based course.

Suggested course from the RIT Mathematics Department:

1016-351 Probability

Discrete Mathematics

Abstract mathematics course that give computer scientists some of the analytical tools needed to reason about algorithms and programs. Topics include symbolic logic, elementary set theory, functions and relations, permutations and combinations, and introductory graph theory. An important topic is the principle of mathematical induction.

Suggested courses from the RIT Mathematics Department:

1016-265 Discrete Mathematics 1
1016-366 Discrete Mathematics 2

Student Advising

Faculty Advisor

Students are assigned a faculty advisor, based on the first initial of a student’s last name (see the table below for current assignments). A student who has not chosen a cluster should seek advice from a faculty member from the following list.
<table>
<thead>
<tr>
<th>Last Name Begins With</th>
<th>Faculty Advisor</th>
<th>Office Location</th>
<th>Advisor’s Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>All BS/MS Students</td>
<td>Hans-Peter Bischof</td>
<td>GOL, 3005</td>
<td><a href="mailto:hp@cs.rit.edu">hp@cs.rit.edu</a></td>
</tr>
<tr>
<td>A – B</td>
<td>Roger Gaborski</td>
<td>GOL, 3647</td>
<td><a href="mailto:rsg@cs.rit.edu">rsg@cs.rit.edu</a></td>
</tr>
<tr>
<td>C – D</td>
<td>Joe Geigel</td>
<td>GOL, 3527</td>
<td><a href="mailto:jmg@cs.rit.edu">jmg@cs.rit.edu</a></td>
</tr>
<tr>
<td>E – F</td>
<td>James Heliotis</td>
<td>GOL, 3515</td>
<td><a href="mailto:jeh@cs.rit.edu">jeh@cs.rit.edu</a></td>
</tr>
<tr>
<td>G – H</td>
<td>Matthew Fluet</td>
<td>GOL, 3555</td>
<td><a href="mailto:mtf@cs.rit.edu">mtf@cs.rit.edu</a></td>
</tr>
<tr>
<td>I – J</td>
<td>Manjeet Rege</td>
<td>GOL, 3557</td>
<td><a href="mailto:mr@cs.rit.edu">mr@cs.rit.edu</a></td>
</tr>
<tr>
<td>K – L</td>
<td>Fereydoun Kazemian</td>
<td>GOL, 3537</td>
<td><a href="mailto:fk@cs.rit.edu">fk@cs.rit.edu</a></td>
</tr>
<tr>
<td>M – O</td>
<td>James Minseok Kwon</td>
<td>GOL, 3547</td>
<td><a href="mailto:jmk@cs.rit.edu">jmk@cs.rit.edu</a></td>
</tr>
<tr>
<td>P – R</td>
<td>Stanislaw Radziszowski</td>
<td>GOL, 3657</td>
<td><a href="mailto:spr@cs.rit.edu">spr@cs.rit.edu</a></td>
</tr>
<tr>
<td>S</td>
<td>Rajendra Raj</td>
<td>GOL, 3619</td>
<td><a href="mailto:rkr@cs.rit.edu">rkr@cs.rit.edu</a></td>
</tr>
<tr>
<td>T – V</td>
<td>Richard Zanibbi</td>
<td>GOL, 3551</td>
<td><a href="mailto:rlaz@cs.rit.edu">rlaz@cs.rit.edu</a></td>
</tr>
<tr>
<td>W – Z</td>
<td>Ivona Bezakova</td>
<td>GOL, 3645</td>
<td><a href="mailto:ib@cs.rit.edu">ib@cs.rit.edu</a></td>
</tr>
</tbody>
</table>

A student may choose an advisor, after the student identifies a cluster, based on interest from the list below.

**Computational Vision and Acoustics**

Prof. Roger S. Gaborski  
Prof. Roxanne Canosa

**Distributed Systems**

Prof. Alan Kaminsky  
Prof. Hans-Peter Bischof  
Prof. James E. Heliotis  
Prof. James Minseok Kwon  
Prof. Leon Reznik

**Computer Graphics and Visualization**

Prof. Joe Geigel  
Prof. Hans-Peter Bischof  
Prof. Warren R. Carithers  
Prof. Sean Strout

**Intelligent Systems**

Prof. Richard Zanibbi  
Prof. Roger S. Gaborski  
Prof. Zack Butler  
Prof. Leon Reznik

**Data Management**

Prof. Rajendra K. Raj  
Prof. Henry A. Etlinger  
Prof. Manjeet Rege  
Prof. Carol Romanowski  
Prof. Xumin Liu  
Prof. Trudy Howles
Security

Prof. Hans-Peter Bischof
Prof. Chris Homan
Prof. Alan Kaminsky
Prof. James Minseok Kwon
Prof. Stanislaw P. Radziszowski
Prof. Rajendra K. Raj
Prof. Leon Reznik

Languages and Tools

Prof. James E. Heliotis
Prof. Hans-Peter Bischof
Prof. Fereydoun Kazemian

Theory

Prof. Edith Hemaspaandra
Prof. Ivona Bezakova
Prof. Chris Homan
Prof. Stanislaw P. Radziszowski

Graduate Academic Advising

The graduate advisor is available to assist and advise graduate students and is able to answer day-to-day questions, such as figuring out what to take next quarter, dealing with a course that you’re having trouble in, completing the paperwork that goes along with being a student at RIT, or just to talk with when you’re feeling a bit overwhelmed.

MS Project and Thesis

The Master’s thesis or project forms the capstone of the MS program in Computer Science. It is a large body of work, which you undertake independently, but under the supervision of a full-time CS faculty member. A project consists of a nontrivial software development effort and a report discussing it; or it is a report dealing with more theoretical questions. Original insight into a problem is desirable but not required. The project report is expected to be a scientific paper:

- describing background and relevant results in the area
- detailing the work carried out
- discussing the significance of the deliverables of the endeavor and providing appropriate reference citations

The project report is to be submitted in electronic and paper copy.

A thesis should deal with a significant question and involve some original insight. Compared to a project, a thesis has a much higher level of expectation in terms of background research and justification. A thesis should also result in a paper submitted to a conference, a journal or other forms of public dissemination. More specifically, the difference between a project and thesis is the technical depth of the work involved. Computer science projects and thesis both have a computer programming aspect and science/engineering component. The requirements for a project are less stringent than for the thesis. The thesis requires more depth and the student should develop a substantial understanding of the topic through library journal research, experimentation, etc. The thesis should take about as much effort as that devoted to two four-credit
courses. The thesis report will be bound and reside in RIT Library’s archives and at least ten years in the Computer Science Department’s reading room. Copies must also be provided to your committee.

The project, after it is well defined and the pre-proposal has been presented at the weekly MS Project/Thesis Seminar and accepted by the student’s committee, should take about as much effort as that devoted to a single four-credit course. The final report must be flat bound and a copy provided to each committee member and one copy must be submitted to the department.

The purpose of a Master’s thesis or project is to be of educational value to the student and to independently create and present a large, interesting, piece of work. Any acts of plagiarism or other acts of academic dishonesty will result in an automatic ‘F’ for the project. If you have any questions regarding plagiarism you should contact your committee chair before you complete your write up or make your presentation. Additionally, by forming your committee and registering for Project or Thesis you have effectively created a contract between your chair and yourself. Your chair will contribute a substantial amount of time guiding project activities. Failure to complete your project or thesis within the agreed upon schedule may result in receiving a grade of ‘F’.

In either case, you will need to write a new Proposal, form a new committee, and register for project or thesis again. In both cases the ‘F’ will remain on your transcript. Additionally, by signing your proposal the committee members agree to serve on your committee for one year. After one year they can resign from the committee if they feel the student is not making adequate progress.

Your Committee

Your project/thesis committee is composed of three members:

- chair
- reader
- observer

The function of the chair is to direct the technical aspects of your project and to ensure that your project or thesis meets the department’s technical and administrative requirements. The chair has to be a member of the CS faculty or extended CS faculty. The extended CS faculty are:

- Justin Domke, Ph.D., PhD Program Computing and Information Sciences
- PengCheng Shi, Ph.D., PhD Program Computing and Information Sciences
- Carol J. Romanowski, Ph.D., Center for Multidisciplinary Studies
- Linwei Wang, Ph.D., PhD Program Computing and Information Sciences

Normally, you will meet with your chair weekly. Monthly progress reports must be posted on your RIT student web page. The reader may also review your monthly reports and provide feedback on your progress or concerns they may have to your chair. Your committee must be provided with a final copy of your report ten days prior to your defense. The reader or observer does not have to be a member of the CS faculty, but must hold a MS degree in CS or a related discipline.

Other faculty members may also review your work and make recommendations to your chair. All advisement will come directly from your chair. The chair, reader and Graduate Coordinator must sign off on your Proposal before you register for project or thesis. The third member of your committee, the observer, will attend your defense and ensure that department guidelines are met. It is most important that you establish a committee before you begin serious work on your project. Failure to do this may cause significant delay in the completion of your degree.
MS Project/Thesis Seminar Registration

As students prepare to begin their project or thesis, they must register for 2 credits of 4005-893, Project/Thesis Seminar. During the quarter, you must develop your pre-proposal in the seminar and form your committee. Students must have completed 16 graduate credit hours with a minimum GPA of 3.0 to register for the seminar.

Outcomes of MS Project/Thesis Seminar

Each student takes the MS Project/Thesis Seminar course. The student will find a chairperson and a project/thesis topic during this course.

- The student writes a pre-proposal.
- The student submits the pre-proposal to the faculty chairperson.
- The pre-proposal gets accepted or sent back to the student for modifications.
- The student writes the proposal, after the pre-proposal gets accepted.
- The proposal gets accepted or sent back for modifications.
- The student sets up a web site, after the proposal gets accepted.
- The student corresponds with faculty chairperson on a regular basis.
- The student updates their web site at least every two weeks.
- The student writes the final report.
- The student defends the project/thesis, after the final report is accepted.

MS Project/Thesis Proposal

The proposal should contain the following sections:

- A summary describing what you will do.
- An overview of the area of your project/thesis.
- A hypothesis.
- How the proposed work will be evaluated against existing work.
- Architectural overview of the planned system; i.e., the design specification. This may be less well understood, hence somewhat shorter.
- A list of the principal deliverables of your project/thesis and the form that these will be delivered, such as: technical paper or report, input/output examples or demonstration, code (the complete system should be given to your principal advisor archived on a single file, user manual, design documentation and maintenance manual.
- Annotated references. This should include the following: previous master’s projects or theses, books, papers, URLs.
- Detailed schedule, including target defense date.
- Status of the work at the present time. Monthly updates must be posted on your RIT web page.

MS Project or Thesis Registration for Credit

To register for Project or Thesis, you must give the office a copy of your Proposal signed by the Graduate Coordinator, the chairperson and reader. The Department has a form for you to complete. Please see page 20 on conditions for automatic withdrawal from the department if registration and completion requirements are not met. If you do not finish your Project or Thesis in the first quarter in which you register for credit, you will receive a grade of ‘I.’ You should continue to post monthly progress reports on your RIT web page until you finish.
Doing a MS Project/Thesis Related to Your Work

A student may be working in the computing field, and find that their work provides them with an opportunity to do projects that are comparable to the MS Project or Thesis, and they would like that work to qualify. This approach is possible, and there is some precedent for doing it. Students can even have a Reader from their place of employment, but the chair of their committee must be a Computer Science faculty member or an associated CS faculty and be knowledgeable in the proposed area of work. The work that will be submitted as the Project or Thesis must be monitored by the faculty members on the committee and the student must post their progress on their RIT web page monthly.

Because a CS faculty member is monitoring your work, this rules out submitting a proposal for work that has already been completed. In addition, the report, and a significant portion of the other work products such as code, must be made available for other students to read in the future. The committee sets the requirements - not the employer. It is your responsibility to assure that your employer’s requirements for confidentiality are respected.

Checklist for the Defense

The last step in the process is the defense. After the student has completed the write up of his/her work and the chair and the reader have approved it, the student defends his work during a 50-minute presentation. The defense is open to the public.

The student is required to follow the procedures outlined below:

- Schedule the defense and register that scheduling with the Computer Science department office; assure all committee members are able to attend; reserve the room with the department staff.
- Assure that the room has all the facilities you require (board, markers, projectors, ethernet connection, etc).
- Post announcements at least 10 days prior to the event (www.cs.rit.edu/programs/grad/forms/Announcement).
- Verify with the department staff that all necessary paperwork has been completed (including current application for graduation).
- Review your presentation with at least one of your committee members typically the committee chair before presenting it formally. The defense should take 50 minutes, but you must allow time for questions and discussion. When you rehearse, it should take 40 minutes.
- A rehearsal is highly recommended. Ask a friend or two or a member of your committee to sit through a complete presentation. This is the only way you will know how long it takes and to locate the bugs (demos that fail, typos, faulty visuals, etc.) in your presentation.
- Prepare handouts for your presentation consisting of copies of your visuals in 4-up or 6-up form. Discuss with your committee chair how many copies to prepare.

Deliverables

The final paperwork for a Project requires that you give each of your committee members and the CS Department a copy of the professionally written report, in a pressboard binder (or some flat binding).

The report must also include a CD/DVD, which has the following content:

- Report in PDF: The filename has to be report.pdf
- Proposal in PDF: The filename has to be proposal.pdf
- Defense announcement in plain text or PDF: The filename has to be announcement.pdf/announcement.txt
- A file which contains the keywords characterizing the work: The filename has to be keywords.txt
The final paperwork for a thesis requires that you arrange for a bound copy of the thesis for the RIT Library, the CS Department, and each committee member (that makes six copies, counting your own). Give the CS Department secretary copies of:

- the thesis binding receipt
- the thesis abstract
- the signed cover page

You will not be certified for your degree until these steps have been completed. Also all graduate students who complete a thesis are required to submit the thesis to Proquest/UMI for publication. **A standard fee of $55 applies and is the sole responsibility of the student.**

Please see [http://library.rit.edu/services/graduate-student-support.html](http://library.rit.edu/services/graduate-student-support.html) for additional information.

**Full Time Equivalency**

Continued, active registration at RIT can be important for students who must maintain full-time student status, such as students with loans to repay or foreign student visas to maintain. Students working on their thesis or project may be registered for less than 12 credits.

To be considered a full-time student even though you are registered for fewer than 12 credits, you must complete a “full-time equivalency” form. The CS Department allows you to apply for full-time equivalency for a maximum of four quarters. You must have a GPA of at least 3.0. Please see the [Graduate Advisor or the Graduate Program Coordinator](#) to complete the appropriate paperwork.

**Miscellaneous Information**

**Electronic Mail**

We use electronic mail extensively for communicating with students. Even when you are not enrolled in programming courses, you should log on and read your mail daily. You should make sure you are subscribed to the grads mailing list. This will put the mailer’s address in the list. The graduate coordinator will use this mailing list to send out information. It is important that you receive this information. Several newsgroups for RIT CS students are now being maintained. You should subscribe to the relevant groups and check news frequently.

Subscribe to the graduate mailing list by sending mail to: [grads-subscribe@cs.rit.edu](mailto:grads-subscribe@cs.rit.edu).

**Computer Science Office**

The CS Student Services office is in Golisano Hall (GOL, Room 3005). The phone number is 585-475-2995; office hours are 8:30am to 4:30pm Monday through Friday. The office maintains records for each matriculated CS graduate student. Bring your policy and procedure questions to the staff in this office (e.g., grade problems, transfer of programs, transfer of credit, forms, registration). This office has forms for change of program, intent to graduate, add or drop a course, and register for project or thesis.

To help us maintain accurate records on you, make sure we have the correct spelling of your name, your current address, your student number, and your day and evening telephone numbers.

**The 7-year Rule for Completing a Degree**

You may not use any courses for graduation that were taken more than seven years ago (this rule does not apply to Bridge Program courses).
**Guidelines for Petitioning for an Extension Beyond the 7-year Limit**

In cases where the fulfillment of degree requirements extends beyond the 7 year limit, the Graduate Coordinator must petition the Graduate Council for a formal extension.

*Please note the following important requirements for these petitions:*

Requirements for the degree must be completed within seven years of the date of the oldest course counted toward the student’s program. For example, if the first course counted toward the degree is taken in 001, that degree must be completed before the end of 064.

Application for an extension should be submitted to the Graduate Program Director at least one full quarter prior to the expiration of the seven-year time limit.

When a student’s program is projected to exceed the seven-year limit, he/she should not be encouraged to take courses or work on a thesis or final project until a decision has been made by the Graduate Council.

A student can apply through the graduate coordinator for an extension of the 7 year rule.

*The student has the following options to prove that the student’s knowledge of the course(s) beyond the seven year limit are current:*

- A student can retake the course(s) at RIT and pass the course with a passing grade.
- A student can retake the course(s) at another institution and pass the course with a passing grade. The Graduate Coordinator must approve this, before the student is allowed to register.
- The student has to pass an exam of the course(s) in writing at RIT. The exam will be similar to a final of the course(s).

*Documents included in the petition submitted to the chair of Graduate Council by the Graduate Coordinator should include the following:*

- Petition support signed by Dean’s office.
- Detailed plan for completion of degree, addressing each unmet requirement. Generally, no more than one calendar year’s extension will be granted.
- Circumstances that delayed completion of degree.
- RIT graduate transcript (and, where relevant, undergraduate transcript).
- Current résumé.
- A copy of the thesis description or final project proposal (if completed).
- A list of courses that will be older than seven years (and by how much) at the projected date of graduation. At the time of certification, the Graduate Coordinator will provide written documentation of the currency of overdue courses.
- Letter of support from graduate coordinator or faculty advisor.

**Loss of Student Status**

*You may be withdrawn from the program if:*

- You fail to register for courses for four successive quarters.
- You have not registered for thesis or project within one year after completing your coursework.
- You have not completed your thesis or project within one year after registering for project or thesis.

*If you are in danger of being withdrawn, please see the Graduate Coordinator.*
Policy on Academic Dishonesty

If a faculty member judges a student to be guilty of academic dishonesty (e.g., representing another person’s work as one’s own), the student may be given a failing grade for that piece of work or for the course and the student will be put on probation. Additionally the scholarship will be removed. A repetition will result in indefinite suspension from the program.

“The Rochester Institute of Technology does not condone any form of academic dishonesty. Any act of improperly representing another person’s work as one’s own is construed as an act of academic dishonesty. These acts include, but are not limited to, plagiarism in any form, or use of information and materials not authorized by the instructor during an examination. If a faculty member judges a student to be guilty of some form of academic dishonesty, the student may be given a failing grade for that piece of work or for the course, depending upon the severity of the misconduct.

If the student believes the action by the instructor to be incorrect or the penalty too severe, appeal may be made to the Academic Conduct Committee of the college in which the course is offered (Approved September 1977).”

Plagiarism

One huge misconception that students have is that rewriting something is not plagiarism, because they are “putting it in their own words.” Well, if the source is not officially acknowledged, it is plagiarism. Copying and pasting actually accounts for only a small percentage of plagiarism. The majority of plagiarism is a result of text manipulation. The accessibility of the Internet makes plagiarism very tempting, and unintentional plagiarism springs from this as well. Simply stated, plagiarism is using someone’s work without giving the appropriate credit.

This can mean several things:

- Copying and pasting text from on-line media, such as encyclopedias is plagiarism.
- Copying and pasting text from any web site is plagiarism.
- Transcribing text from any printed material, such as books, magazines, encyclopedias or newspapers, is plagiarism.
- Simply modifying text from any of the above sources is plagiarism. For example, replacing a few select words using a Thesaurus does not constitute original work.
- Using photographs, video or audio without permission or acknowledgment is plagiarism. You may use such a photographic, video or audio source with or in a paper or multimedia presentation that you create, as long as you do not profit from it or use it for any purpose other than the original assignment. You must include the source in your bibliography.
- Using another student’s work and claiming it as your own, even with permission, is academically unethical and is treated as plagiarism. This is known as “collusion” and is not allowed.
- Acquiring work from commercial sources is academically unethical and is treated as plagiarism.
- Translation from one language to another is not using your own words.
- Using an essay that you wrote for another class/another purpose without getting permission from the teacher/professor of both the current class and the class for which the original work was used is self-plagiarism and is basis for consequence or penalty.
- You may use your previous work as a basis for new research of course, but include the original work in your bibliography.
# Computer Science MS Program of Study

## Bridge Program

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credits</th>
<th>Projected Quarter</th>
<th>Quarter</th>
<th>Grade</th>
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<td>4003-241</td>
<td>Problem-Based Intro to CS</td>
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<td>4003-242</td>
<td>Data Structures for Problem Solving</td>
<td>4</td>
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<td>4003-243</td>
<td>Object-Oriented Programming</td>
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<td>4003-334</td>
<td>Computer Science IV</td>
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<td>4003-700</td>
<td>Foundations of Computer Theory</td>
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<td>Advanced C++ and Program Design</td>
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<td>4003-707</td>
<td>Advanced Java Programming</td>
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<td>Computer Organization</td>
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<td>4003-713</td>
<td>Operating Systems</td>
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<td>Probability</td>
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## Graduate Program

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<th>Quarter</th>
<th>Grade</th>
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*A fifth elective is required if Project path is chosen.*