

M.S. DEGREE PROGRAM

IN

CHEMISTRY

POLICIES AND PROCEDURES

Revised Annually for consistency with the graduate bulletin

Department of Chemistry
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TABLE OF CONTENTS

I. Introduction to the Department of Chemistry	
1. Programs of Graduate Study	1
2. Research Facilities	1
3. The Institute	2
II. M.S. Degree Programs in Chemistry	3
III. Admission and Academic Status	
1. Admissions	4
2. Non-Matriculated Status	5
3. Readmission	5
4. Academic Probation and Suspension Policy	6
IV. Assistantships and Scholarships	
1. Awards Application	7
2. Teaching Assistantships	7
3. Graduate Student Adjunct	8
4. Graduate Scholarships	8
5. Research Assistantships	8
6. Evaluation and Review	8
V. Chemistry M.S. Degree Program Guidelines	
1. Orientation	10
2. Scheduling and Registration	10
3. Graduate Advisor	10
4. Placement Examinations	11
5. Core Courses	12
6. Seminar Requirement	13
7. Industrial Research	13
8. Cooperative Education	13
VI. Thesis Option	
1. Advisor	14
2. Schedule	14
3. Seminars	16
4. Oral Examinations	16
5. Thesis	18
6. Certification	22
VII. Non-Thesis Option	
1. Advisor	23
2. Schedule	23
3. Seminars	25
4. Capstone Experience	25
5. Certification	25
VIII. Faculty Profile	27
IX. Graduate Forms	
1. Form 1	45
2. Form 2	46
3. Form 3	47
4. Form 4	48
5. Form 5	49
6. Form 6	50
7. Form 7	51
8. Form 8	52
9. Form 9	53
10. Teaching Assistant Evaluation Form	54
X. Sample Thesis Pages	55

I: INTRODUCTION TO THE DEPARTMENT OF CHEMISTRY

I.1 Programs of Graduate Study

For the student interested in the chemical sciences, the College of Science offers Chemistry, Clinical Chemistry and Materials Science and Engineering programs leading to the M. S. degree. In addition, the College of Science offers a Ph.D. program in Imaging Science. Within these programs, a variety of options have been designed to fill the needs of both the full-time graduate student as well as enabling practicing chemists in the greater Rochester industrial community to pursue an advanced degree on a part-time basis. These programs combine traditional course work with an opportunity to engage in research to increase the breadth and depth of the student's background, in addition to providing students with an avenue to pursue their own scientific interests.

I.2 Research Facilities

The Department of Chemistry has a dedicated research-oriented faculty; excellent equipment and facilities appropriate to enable graduate students to engage in a program of independent study which will develop their abilities to attack scientific problems at a research level.

The Department of Chemistry is housed in the College of Science, along with the Departments of Allied Health, Biology, Imaging Science, Mathematics and Statistics, and Physics. The Department has 11,500 square feet of teaching laboratory space. Seven research laboratories (8,000 square feet) are designed for chemical research by undergraduates, graduates and faculty. Another 3,000 square feet is devoted to support facilities. These include a cold room, biochemistry prep room, balance room, chemical stockroom, and a graduate student office.

The scientific instruments available for chemistry student use includes: a Bruker DRX-300 NMR (multi-nuclear probe, temperature controller and pulsed gradient coils), Perkin Elmer Plasma II Emission Spectrometer, HP-5995 and 5987 GC/MS (chemical ionization, and TGA interface), Seiko Instruments TG/DTA-220, DSC-220, DMS-200 and DMS-110 (liquid N₂ temperature controllers), Perkin Elmer 1760X FT-IR (attenuated total reflectance cell), Perkin Elmer LS50B Luminescence Spectrometer, 2 Hewlett Packard diode array spectrophotometers (autosampler and kinetics package), 3 Waters 650 Protein Separation Systems, HP-30 Capillary Electrophoresis, Perkin Elmer Thermal Cycler, in addition to various HPLC and GC chromatography units, and assorted older-model IR and UV/Vis spectrometers. Most of the scientific instrumentation is computer interfaced. Some of the more sophisticated instruments are configured for remote access.

In addition to the computers designated to the various instruments, chemistry graduate students have access to numerous computing facilities on campus. Molecular modeling, statistical analysis and computational chemistry can be performed in the Department's computer lab. Computer labs with graphical workstations adjoin the College of Science. Additionally, students have access to the Internet through the Institute's VAX/UNIX mainframes.

I.3 The Institute[†]

Approximately 16,000 students attend RIT. More than 2,500 are enrolled in graduate programs. Of these, 120 undergraduates and 20-30 graduate students are working toward degrees in chemistry, biochemistry and polymer chemistry. Students have come from all 50 states and from more than 100 foreign countries.

Rochester Institute of Technology, founded in 1829, is a privately endowed, coeducational, non-sectarian, fully accredited institution. RIT focuses on offering specialized courses of study in professional technical areas. It is comprised of six colleges: Applied Science & Technology, Business, Engineering, Imaging Arts & Science, Liberal Arts, and Science. In addition it is the site for the National Technical Institute for the Deaf and the Center for Integrated Manufacturing Studies. Many departments at RIT, including the Department of Chemistry, have a cooperative education program that enables undergraduate and graduate students to alternate quarters of industrial work experience with academic course work. In October 1968, RIT relocated to a completely new \$160 million, 1,300-acre campus, five miles from downtown Rochester. In 1998, the College of Science will expand into a new \$13 million facility.

Rochester is a recognized center of technology and science, with a high proportion of scientists, technologists, and skilled workers in the population. Industrial and corporate leaders include Eastman Kodak, Xerox, Bausch and Lomb, Sybron Corporation, Rochester Products and Astra Pharmaceuticals. Rochester is also a noted cultural center where support of music, art, theater, libraries, and museums is a matter of pride.

[†] <http://www.rit.edu/about/>

II: M.S. DEGREE PROGRAMS IN CHEMISTRY

The Department of Chemistry, Rochester Institute of Technology, offers two 45-credit hour program options leading to the degree Master of Science in Chemistry. The Thesis Option is designed for those students seeking the traditional research-intensive master's degree. The Non-Thesis Option is designed to offer students a flexible program that can be tailored to their career interests.

The **Thesis Option** is a focused study within a specific field of chemistry, culminating with the submission and defense of a written thesis. The student will complete 9 to 16 credit hours of research and three oral exams, and give two public seminars. Breadth in the program is provided by the core courses and one non-chemistry course. Thesis research is generally conducted at RIT in the laboratory of a student's research advisor and culminates in the publication of a written original thesis. Thesis research may also be conducted at an industrial site with an external co-advisor at that site. The thesis option is the recommended course of study for full-time students pursuing the M.S. degree in chemistry.

The **Non-Thesis Option** is intended for a selected set of students desiring breadth and flexibility in their academic program. Students can fulfill the degree requirements solely through course work, or they can engage in research projects. The research project(s) cannot exceed a total of 8 credit hours and must culminate in a presentation of the project(s) results. Students electing this option may petition to take more than one course from outside the Chemistry Department to broaden the scope of their program. Students may also use industrial projects, or cooperative education experience to complete their M.S. degree requirements within the context of this option. This option is ideal for part-time students, or students wishing to complete a multi-disciplinary M.S. degree.

This manual describes departmental policies and the requirements for an M.S. degree in either option. Inquiries concerning the RIT M.S. degree programs in Chemistry are invited, and should be directed to the Chair, Chemistry Graduate Committee, Department of Chemistry, Rochester Institute of Technology, Rochester, New York 14623.

Application for admission is made through the Graduate Admissions Office, Rochester Institute of Technology, Rochester, New York 14623-5604.

Inquiries concerning the Clinical Chemistry, Imaging Science and Materials Science and Engineering graduate programs should be directed to these programs, separately.

III: ADMISSION AND ACADEMIC STATUS

III.1 Admissions

The application for graduate study can be obtained on-line through the RIT Office of Graduate Enrollment Services, <http://www.rit.edu/~w-ptgrd/index.html>. The completed application, with three letters of recommendation, and all other pertinent data should be sent directly to the Office of Graduate Enrollment Services Office, Rochester Institute of Technology, 58 Lomb Memorial Drive, Rochester, New York 14623-5604. All applicants are required to submit Graduate Record Examination (GRE) scores as part of their application. Submission of scores from the GRE Chemistry Subject Examination is recommended, but not required. Applicants for whom English is not the primary language must submit Test of English as a Foreign Language (TOEFL) scores along with their GRE scores. The applicant is encouraged to visit the Department to supplement the application process.

The following criteria must be met to receive acceptance to the program:

- a. Baccalaureate degree from an accredited college or university, or an equivalent acceptable to the Chemistry Graduate Committee.
- b. Demonstrated ability to maintain at least a GPA of 3.0 out of 4.0.
- c. Experience equivalent to a full year's course in each of general, analytical, organic, and physical chemistry; physics and calculus.
- d. A TOEFL score above 550, a demonstrated proficiency in English via the Michigan Test administered at RIT, and an acceptable GRE verbal score.
- e. Approval for admission by the Institute and the Chemistry Graduate Committee.

When a completed application has been verified by the Graduate Admissions Office (this generally takes 7 to 8 weeks), the applicant's folder is submitted to the Department of Chemistry for approval. The admissions decision is made by the Chemistry Graduate Committee. The Chair of the committee normally acts as the agent for the Department. Notice of action taken is forwarded to the Admissions Office. The Admissions Office at RIT is authorized to advise the applicant of the action taken. No commitment of scholarship or assistantship may be made until a letter of acceptance is issued by the Admissions Office.

III.2 Non-Matriculated Status

Applicants are permitted to take graduate courses as non-matriculated students if they have a baccalaureate degree from an accredited college or university, and if they possess the necessary background for the specific course in which they wish to enroll.

The courses taken for credit can usually be applied toward the master's degree at the time the student is formally admitted to the graduate program. However, there is a limit of 9 quarter credits (two to three courses), earned as a non-matriculated student, which can be transferred into the student's graduate record.

It is suggested that any applicant who wishes to enroll in a graduate course as a non-matriculated student should obtain permission from the Chair of the Chemistry Graduate Committee and from the course's instructor.

III.3 Readmission

If a student has become inactive (has not completed a course in four consecutive quarters) or has withdrawn from RIT, Institute policy requires the student to reapply for admission. Readmission applications are handled according to the following procedure:

- a. Students who left the program with a GPA of 3.0 or better (were in good academic standing) and will return to the program within two years of the time their last course was completed, will be readmitted to the program upon submitting a readmission application.
- b. Students who left the program with a GPA of 3.0 or better and return to the program later than two years since the last course was completed, must meet the current admission standards for readmission. The program of study shall be subject to review and must be rewritten. Previous waiver and/or transfer credit may be lost, and program deficiencies may need to be remedied.
- c. Students who left the program with a GPA below 3.0 must meet current admissions standards for readmission. The decision to reaccept the student to the program will be based on all information, including previous graduate level work. Previous waiver and/or transfer credit may be lost and program deficiencies may not be remedied. In addition, the Department will decide which previous courses, if any, will be applicable toward the degree.
- d. The Seven-Year Rule. In all cases, students must complete the program within seven years of the date the earliest course counted toward their degree program. This does not apply toward prerequisites, Bridge Program courses in Computer Science, or similar requirements in other departments.

III.4 Academic Probation and Suspension Policy

Matriculated graduate, full-time or part-time, degree students will be placed on academic probation, or will be suspended from the Institute according to the criteria enumerated below.

- a. Any matriculated graduate student whose Program Cumulative Grade Point Average[‡] falls below a 3.00[§] after 12 or more quarter credit hours will be placed on academic probation and counseled by the departmental advisor concerning continuation in the graduate program.
- b. Those students placed on probation must raise their Program Cumulative Grade Point Average to the 3.00 level within 12-quarter credit hours or be suspended from the graduate program.
- c. Should it be necessary to suspend a graduate student for academic reasons, the student may apply for readmission with the Chair of the Chemistry Graduate Committee, who will consult with the Department Head and the Dean's Office of the College of Science.
- d. A student who has completed all course credits but has not finished the thesis must register for Continuation of Research in all subsequent quarters until the degree is complete. Failure to do so may result in a requirement to reapply for entrance into the program.

[‡] As defined in the RIT Graduate Bulletin
[§] B average

IV: ASSISTANTSHIPS AND SCHOLARSHIPS

Students who are matriculated in the M.S. Chemistry program are eligible for financial awards, to help defray the expense of their graduate education. These awards may consist of tuition remission and/or a stipend, depending on whether the award is (1) a teaching assistantship (TA), (2) a graduate student adjunct (GSA), (3) a graduate scholarship, or (4) a research assistantship (RA). A description of these awards follows, along with the responsibilities associated with them.

IV.1 Awards Application

Application materials for financial awards are included in the admissions application packet sent out by the Department of Chemistry. Although the application for admission to the program gets sent to the RIT Graduate Admissions Office, the application for a financial award must be acted on by the Department of Chemistry and the Chemistry Graduate Committee. Students desiring a TA or GSA should arrange for a live interview, either by phone or in person, with the Chair of the Chemistry Graduate Committee. The financial awards decision is made by the Chemistry Graduate Committee, in consultation with the Department Head. Awards decisions are generally made by the middle of the academic quarter prior to when the awards go into effect. TA decisions for the Fall academic quarter are generally awarded by April 15th of the previous academic year. Students receiving a financial award will be notified, in writing, by the Chemistry Department Head. No financial award can be given to a non-matriculated student.

IV.2 Teaching Assistantships

Teaching assistantships entitle the recipient to full tuition remission and a monthly stipend. In return for the award, TAs will be expected to carry out the following duties: (1) teach undergraduate laboratories for a maximum of 10 contact hours per week; (2) assist faculty members in the grading of undergraduate examinations, homework and laboratory reports; (3) arrange and observe office hours for students who desire help in courses for which you are responsible; and (4) be knowledgeable about the course materials for which you are responsible. It is estimated that these duties would require approximately 15-20 hours per week. Teaching assistants are given 1-year contracts, which are renewed for a second year, provided they are in good academic standing, and have adequately performed their TA duties.

IV.3 Graduate Student Adjunct

Graduate student adjuncts receive quarterly contracts to teach specific courses. The adjunct position entitles students to a stipend for the courses they teach. Tuition remission is not directly connected to this award, although many students receive

tuition remission through other sources. The GSA is responsible for the same duties as the TA, and is subject to the same review process. Since graduate student adjuncts are hired per course, the time spent per week teaching, grading and advising is commensurate with the number of courses for which they are responsible.

IV.4 Graduate Scholarships

Graduate scholarships entitle the awardee to receive partial tuition remission for a full academic year. Graduate scholarships are awarded by April 15th for the following academic year. Graduate scholarships may be renewed for a second academic year. The amount of tuition a scholarship awardee receives depends on several factors, including: (1) the student's academic record; (2) the student's progress toward their degree, and (3) the quality of the applicant pool.

IV.5 Research Assistantships

Students who have made good academic progress toward their degree by the first summer of residence in the program may apply for summer research support. Students who have been awarded a summer research assistantship will receive a stipend, or tuition remission, in return for spending the summer working in their advisor's research lab. Students seeking RA positions during other academic quarters can petition the Chemistry Graduate Committee or gain support from their advisor's grant(s).

IV.6 Evaluation and Review

All financial awards come with the student's responsibility of staying in good academic standing (GPA of 3.0 or greater) and making steady progress toward their degree. If these criteria are not met, the award will not be renewed, and may be revoked. In addition, TAs and GSAs are subject to teaching evaluations from both their students and from their faculty coordinators. Specific guidelines and expectations will be provided by the faculty coordinator prior to and during the quarter the TA or GSA is teaching. TA/GSA evaluations will be taken into consideration when renewing teaching contracts. This process of review and evaluation is to ensure that financial award recipients fulfill their primary goal in the program, obtaining their degree.

V: CHEMISTRY M.S. DEGREE PROGRAM GUIDELINES

The chemistry graduate program is a 45-credit hour program leading to the Master of Science degree in chemistry. When taken as a full-time student, completing the program requires, nominally, 2 years. All students must complete the program in a seven-year time period. Students can choose either a Thesis or a Non-Thesis option to fulfill the degree requirements. These options will be described separately. However, there are some general guidelines, common to both options, which will be presented first.

V.1 Orientation

All newly matriculated graduate students should arrive a week in advance of their first academic quarter. This should be sufficient time to find a residence, get acclimated to the campus, and go through the graduate student orientation. Orientation is run in a formal group activity prior to the fall quarter. Students who enter the program during the other academic quarters will receive a one-on-one orientation by a member of the Chemistry Graduate Committee.

During orientation new graduate students will: (1) be introduced to the faculty; (2) be introduced to their classmates; (3) review the Chemistry M.S. program guidelines; (4) be advised on course registration; (5) receive computer accounts; (6) receive keys and desk assignments; (7) schedule placement examinations; (8) be introduced to chemistry stockroom procedures; and (9) take an OSHA certified laboratory safety course. The latter must be taken once a year while being enrolled in the program. Additionally, TAs and GSAs will be trained in teaching and communication techniques during the orientation week.

V.2 Scheduling and Registration

The College of Science Dean's Office will be responsible for maintaining academic records, and the Department must provide information to the student as to progress in the graduate program. It is the responsibility of each graduate student to maintain a current address on file with the Departmental and Dean's Offices.

V.3 Graduate Advisor

During the first quarter of attendance for a new graduate student, the Chair of the Graduate Committee will act as the student's academic advisor. Graduate students will be counseled by a permanent academic (Non-Thesis Option) or research advisor (Thesis Option) starting with their second quarter of attendance.

V.4 Placement Examinations

Graduate students are expected pass the preliminary placement-qualifying (PPQ) examinations in Analytical, Organic, Inorganic and Physical chemistry by the end of their second academic quarter of attendance. The exams are used primarily for determination of courses to be taken and remediation needed by any given graduate student. Therefore, it is imperative that new graduate students take them during their first academic quarter. Intensive review is generally advised as preparation for each examination. The following faculty can be consulted for advice on how to study for the PPQ examinations, or methods of general review in the subject areas cited.

- Analytical Chemistry: Dr. L. Paul Rosenberg, E-mail: lprsch@rit.edu
- Organic Chemistry: Dr. Jeremy Cody, E-mail: jacsh@rit.edu
- Physical Chemistry: Dr Christopher Collison E-mail: cjcscha@rit.edu or Dr. Andreas Langner, E-mail: axlsch@rit.edu

The PPQ exams are standardized examinations, published by the American Chemical Society to be used by graduate chemistry programs throughout the USA. The pass/fail decision is based on the national statistics for a given exam. The following criteria are used in arriving at this decision:

- Pass: A score of 50% or more constitutes a pass.
- Conditional Pass: A score > 30% but < 50%. The student will be advised regarding necessary areas of improvement.
- Fail: A score less than 30% constitutes a fail. The student will be advised regarding sources of remedial help. The PPQ must be taken again, and passed, by the end of the second quarter in the program.

V.5 Core Courses

Whether graduate students choose the Thesis Option or the Non-Thesis Option, to ensure a sufficiently broad knowledge base in chemistry, all students must complete the graduate chemistry core curriculum:

- Analytical Chemistry 1008-711: (Fall and Winter)
- Organic Chemistry 1013-737 (Fall) or 1013-739 (Spring, in alternate years)
- Physical Chemistry - SChP-741, 743 (Winter) or 744 (Spring)

All new graduate students must take 1008-621: Instrumental Analysis lab during their first year of attendance in the program. This course is offered during the Fall and Winter quarters.

To round out the graduate core courses, chemistry graduate students must take either a graduate inorganic chemistry course, 1012-764, or they must take the graduate biochemistry course 1009-702.

A passing grade, on the first attempt, for the three PPQ exams which correspond with this core curriculum will enable the student to waive 1 of the above given lecture core courses. A conditional pass does not qualify to obtain this waiver.

A chemistry course must be numbered at least at the 600 level or above to be part of the M.S. program. Students are limited to nine credits only at the 600 level. The core courses are as follows:

Any course in which a “D” or “F” is obtained will not apply toward the 45 credit minimum, nor will it satisfy the core course requirement. Courses in which grades of “C”, “D” or “F” are received may be repeated with permission from the graduate advisor and the Department Head. Grade point averages will include the original course’s and the repeated course’s grade. “F” grades most often occur if an incomplete in a course, an “I” grade, has not been remedied within two academic quarters of the official end of the course.

V.6 Seminar Requirement

As part of their course requirements, matriculated Chemistry M.S. degree candidates are expected to present departmental seminars. Each thesis-option student must register for two-quarter credits of seminar (1010-870). One credit is taken early on and generally presents results from a literature study carried out in preparation for beginning thesis research in a specific area. The second is given for the thesis defense at the end of the degree. Each non-thesis-option student must register for one-quarter credit of seminar. Graduate student seminars must be scheduled prior to the quarter in which they are given, by submitting a general seminar topic to the faculty member coordinating seminar and by arranging an agreed upon seminar date. Prior to their seminar presentation, students should submit a written abstract of their seminar to the

Department secretary to be included with their seminar announcement. The grade for the seminar presentation will be determined from the grades submitted by the faculty members attending the seminar (FORM 3).

V.7 Industrial Research

Chemistry graduate students can gain credit toward their degrees by performing research at an industrial site. Up to 16 credits of 1010-859: Industrial Research can be applied toward the M.S. degree in the thesis option, provided the work can be presented as a published thesis. If the work is proprietary, up to 8 credits can be applied toward the M.S. degree for students electing the non-thesis option. All industrial work must be started after the student becomes matriculated in the graduate program to receive graduate credit. If work is performed at an industrial site, an industrial advisor must serve on the student's Oral Committee (thesis option) or graduate committee (non-thesis option). Since industrial time lines rarely conform to academic schedules, modifications in students' academic schedule can be made to accommodate their employment responsibilities. Rescheduling will be the responsibility of the student's graduate committee.

V.8 Cooperative Education

Students in the master's program can obtain full-time industrial employment during one or more quarters of their degree program through the Cooperative Education Office. If industrial employment permits research, students may register for 1010-859: Industrial Research, and apply these credits toward their degree. Restrictions on the number of credits that can be applied toward the M.S. degree in the two-degree options are given in the sections devoted to these options. (see VI: Thesis Option and VII: Non-Thesis Option)

VI: THESIS OPTION

The Thesis Option is a focused study within a specific field of chemistry, culminating with the submission and defense of a written thesis. The student will complete 9 to 16 credit hours of research and three oral examinations, and will give two public seminars. Breadth in the program is provided by the core courses and one non-chemistry course. The thesis work may be conducted at an industrial site, provided that it culminates in a written thesis.

VI.1 Advisor

Prior to the completion of one quarter of full-time work, or 9 credit hours for the part-time student, students in the thesis option must choose a faculty member who will serve as their research advisor. The selection must be approved by the potential advisor, the Chemistry Graduate Committee and the Department Head. Each student must interview a minimum of 4 faculty members as potential research advisors. To validate the process the student submits FORM 1 to the Chair of the Chemistry Graduate Committee.

VI.2 Schedule

As soon as a research advisor has been approved, the student and the advisor will prepare the entire program that will be pursued, including remedial (e.g., undergraduate) courses. FORM 2 is used to list all courses to be used toward the student's degree. It is then submitted by the advisor to the Chemistry Graduate Committee Chair and the Department Head for approval. The student's program must meet the minimum course requirements given below.

A minimum of 45 quarter credit hours beyond the baccalaureate degree is required to obtain the M.S. degree in Chemistry. Courses for credit in chemistry are chosen from the 600, 700 and 800 numbered courses of the Department. Courses below the 600 level can only be chosen to fulfill the non-chemistry course requirement. No more than nine 600-level credits can be applied toward the M.S. degree.

Students choosing the thesis-option must complete a minimum of 9 quarter credits of 1010-879, Research and Thesis Guidance. The maximum number of research credits is 16. Students who are performing their thesis work at an industrial site must complete 9 to 16 quarter credits of 1010-859, Industrial Research. Industrial research must culminate in a publishable thesis to be considered for the thesis-option.

Minimum Course Requirements (Thesis Option)

<u>Category</u>	<u>Credits</u>
Chemistry Courses ^a	23
Thesis Research (1010-879) ^b	9
Seminar (1010-870)	2
Related, Non-Chemistry Course ^c	3-4

Total 45

a Includes core requirements

b Thesis research can count for up to 16 credits

c Not the most basic, beginning course in the field, but need not be a graduate level course. Advisor approval prior to registration is required.

The following time line should be useful in planning the degree program:

<u>Quarter</u>	<u>Activity</u>
1	<ul style="list-style-type: none"> ✓ PPQ exams, choose research advisor - FORM 1 ✓ Program of study - FORM 2
2	<ul style="list-style-type: none"> ✓ Literature review and Seminar (preferred) - FORM 3 ✓ Appoint Oral Committee - FORM 4, 5 ✓ Second round of PPQs, if necessary
3	<ul style="list-style-type: none"> ✓ First Oral - Proposal of Research - FORM 6a (Could be combined with 1st seminar)
4	<ul style="list-style-type: none"> ✓ Research - This usually coincides with the summer quarter.
5*	<ul style="list-style-type: none"> ✓ 2nd Oral - Progress report - FORM 6b
7	<ul style="list-style-type: none"> ✓ Start writing the thesis
8	<ul style="list-style-type: none"> ✓ 3rd Oral - Thesis Defense/Seminar - FORM 7 ✓ Certification of Degree - FORM 8

** After first summer of research*

VI.3 Seminars

As part of the core course requirements, thesis-option students must present two public departmental seminars. Graduate students should register for 1010-870: Chemistry Seminar in the quarters in which they will present their seminars.

The **first seminar** is a one-hour presentation based on literature, which is helpful background for the student's thesis research. Guidance on the selection of a seminar topic may be provided by the student's research advisor. The seminar may be scheduled to precede the first oral examination (preferred); however, it cannot be given later than the second oral exam. The evaluation of the first seminar by the faculty audience is reported on FORM 3.

The **second seminar** is given in conjunction with the third oral exam, which together constitutes the thesis defense. This seminar is based on the thesis research and is followed by a question and answer period conducted by the seminar audience and the Oral Committee (the latter being in closed session). A worked-up thesis draft must be provided to the Oral Committee at least one week before this event. The evaluation of the second seminar by the Oral Committee is recorded on FORM 7.

VI.4 Oral Examinations

Graduate students who have chosen the thesis option must pass a series of two oral comprehensive exams and an oral thesis defense. The purpose of the Oral Examination is to evaluate and advise students on their research progress and their general knowledge of chemistry. The role of evaluator and advisor is performed by the Oral Committee. Members of the committee can make specific recommendations for remediation to assist the student in areas of weakness.

The Oral Committee is formed during the graduate student's second quarter of attendance and prior to the student's first oral exam. The Oral Committee is appointed by the Chemistry Graduate Committee Chair (FORM 5) at the request and suggestion of the student and the research advisor (FORM 4). The student's oral committee must be formed in time to enable the student to complete his first oral exam by the end of the third quarter of attendance.

Every oral exam is to be culminated by a discussion - in the student's absence- of the student's performance and progress. The Oral Committee's pass/fail decision is recorded on FORMS 6a and 6b (FORM 7, in the case of the thesis defense). The Oral Committee's decision and recommendations will be shared with the examinee via FORM 6a, 6b or 7. The Oral Committee should also review the student's complete academic record. Each graduate student, after completing 12 quarter credit hours of

course work, must maintain a cumulative grade point average 3.0 or higher. (See Academic Probation and Suspension Policy.)

a. First Oral Examination

The first oral examination for thesis-option candidates will be held in the third quarter of the student's first year in the program. The subject of the oral is usually a general discussion of the proposed research. A short (ca. 3 page) description of the project and a thorough list of pertinent literature citations should be distributed to Oral Committee members at least one week prior to the scheduled oral examination date. The Oral Committee may also offer suggestions to help define and refine the research ideas presented. It is the committee members' responsibility, including the research advisor, to evaluate the first oral.

The 1st oral exam is finalized by completing FORM 6a

In the event of an unfavorable evaluation, the Oral Committee should immediately decide upon specific action to be taken. One or more of the following recommendations could be made:

- Additional Oral presentations
- Special written assignments
- Special seminar or other oral assignments
- Specific undergraduate or graduate course assignments
- Dismissal from the M.S. degree program

b. Second Oral Examination

The second oral examination for thesis-option students will be held in the quarter following the student's first summer of attendance in the program; for most students, this will be their fifth academic quarter. The purpose of the oral is to review the student's research activities to date, especially summer work, and to continue discussions on appropriate topics resulting from the first oral examination. To assist the Oral Committee in the evaluation of the examinee's research activities, each student must submit a research summary to the members of the Oral Committee at least one week before the scheduled exam date. This report should be reviewed by the Research Advisor before going to the Committee, and should contain a statement of research goals, results to date, and a projection of future experiments to be performed in order to complete the thesis. Remedies for unacceptable work include those listed above. If a student has accumulated less than 9 research credits at the time of the second oral, a switch to

the non-thesis option may be recommended. The 2nd oral exam is finalized by completing FORM 6.b

c. Final Oral Examination

The final oral examination for thesis-option candidates is the thesis defense, and is to be culminated by completing FORM 7. This examination is to be taken at least two weeks before convocation for students completing their M.S. degrees in the spring quarter. The seminar is followed by a question and answer period, which is conducted, successively, by the seminar audience and then the Oral Committee. The written thesis is to be made available to each committee member, in a form acceptable to the research advisor, at least two weeks before the final oral exam. The draft should be of a good quality and near final form. The pass/fail decision for the thesis and the final oral is to be recorded on FORM 7. The second seminar grade is also to be recommended on FORM 7. Remedies for unacceptable work include more experimentation and repeating the final oral. In the event that a student must leave RIT before the thesis is complete, all experimental work must be finished before leaving the Institute.

FORM 8 is to be initiated by the research advisor upon the submission of the finished thesis to the RIT library, return of all lab equipment to the stockroom, and return of all keys to the College of Science Dean's Office.

VI.5 Thesis

A thesis is the culmination for the Thesis Option degree. The thesis is a report of the student's research progress a bound copy of which will be housed in the library for generations to come. The quality of the thesis is what you will be remembered by. The thesis must be approved by the student's Oral Committee and accepted by the library. An approved thesis that has been accepted by the library constitutes a publication, in fact an electronic thesis or dissertation (ETD) must be submitted to ProQuest/UMI in PDF format.** This process should not preclude additional publications in the refereed scientific literature.

The key to good thesis writing is organization and planning. Students are encouraged to read the following guidelines carefully. An excellent guide for writing style is *The ACS Style Guide, A manual for Authors and Editors*, (J.S. Dodd, Editor, ACS, Washington, DC, 2nd Ed, 1997).

** http://library.rit.edu/userservices/pubschol/ProQuest_UMI_SubmissionGuide.pdf

Contents: In keeping with the spirit of the scientific method, the thesis should contain the following pages and sections. Sections indicated as optional are not required.

1	Title Page	8	Introduction
2	Copyright Release Form	9	Experimental or Methods
3	Abstract	10	Results
4	List of Figures (optional)	11	Discussion
5	List of Tables (optional)	12	Conclusions
6	Acknowledgments (optional)	13	References
7	Table of Contents	14	Appendices (optional)

A few specific details and examples follow (See page 50 for some sample page layouts.).

Copyright Release Form: Occasionally RIT receives requests for copies of a thesis. You may or may not wish to grant Wallace Memorial Library the right to make a copy of your thesis when a request is received. Your choice is implemented by signing the appropriate permission or deny-permission Copyright Release Form.

Abstract: The abstract is a brief summary of your thesis. See any abstract in the scientific literature as an example. The length should be approximately 100 to 200 words.

References: References are a list of scientific literature cited in the thesis. These should follow one of two formats: listing by number or listing by author's name and date. For example:

Both algorithms set equal to zero any data point with a value less than an arbitrary noise figure as defined previously.¹³

Both algorithms set equal to zero any data point with a value less than an arbitrary noise figure as defined previously (13).

Both algorithms set equal to zero any data point with a value less than an arbitrary noise figure as defined previously (Fletcher, *et al.* 1993).

Collate all references at the end of the manuscript in numerical order of citation if listed by number and in alphabetical order if cited by author.

The exact format of the reference may vary slightly between the subdisciplines of chemistry. You should use the format acceptable in your subdiscipline. References to journal articles should contain authors, title of article, journal name in italics, volume (bold), pages, and year as presented in the following examples. Refer to *The ACS Style Guide* or *CASSI* for abbreviations of journals.

13. Fletcher, L.M.; Barsotti, J.B.; Hornak, J.P., "A Multispectral Analysis of Brain Tissues", *Magn. Reson. Med.* **1993**, *29*, 623-630.

An alternative format for some disciplines of chemistry is:

13. Fletcher, L.M.; Barsotti, J.B.; Hornak, J.P.; "A Multispectral Analysis of Brain Tissues." *Magn. Reson. Med.* **29**:623-630 (1993).

References to books should contain the author(s), title in italics, publisher, city, and year. You may also wish to include the *ISBN* number.

3. D.A. Skoog, J.J. Leary, *Principles of Instrumental Analysis*; Saunders: NY 1992.

References to book chapters in an edited book should contain authors, title of chapter, title of book in italics, editor, publisher, city, year, page or chapter.

25. J.P. Hornak, L.M. Fletcher; "Multispectral Image Segmentation in Magnetic Resonance Imaging" in *Digital Image Processing Method*; E.R. Dougherty, Ed.; Marcel Dekker: NY, 1994; chapter 3.

Additional formats can be found in *The ACS Style Guide*.

Appendices: Appendices should, if necessary, have their own table of contents. The individual pages of an appendix should be numbered with the letter of the appendix and ascending page numbers (*i.e.*, A1, A2, A3....).

Format

Page Size: 8.5 by 11 inch 100% rag, low acid, bond paper should be used for the original copy of the thesis. This paper deteriorates less over time than wood pulp paper. Paper amenable to an ink-jet or laser printer should be used.

Margins: Left Edge: 1.5 inches
Right Edge: 1.0 inches
Top Edge: 1.0 inches
Bottom Edge: 1.0 inches

Spacing: Double spaced for the general text of the manuscript, but single space for long tables, quotations, footnotes, and captions.

Font: A font that gives 26 lines of text per page should be chosen. In many cases this will be a 10, 11, or 12-point font.

Figures: All figures should be legible and of *journal quality*. Please refer to a chemistry journal or *The ACS Style Guide* for examples. Do not paste original line drawings or spectra on pages. In some cases a high quality photocopy will be acceptable, but in most cases a line drawing

or laser printed plot will be necessary. Good, clear ink-jet print copy is acceptable. White out is not permitted. All figures should conform to the margin restrictions listed above. All figures should contain a caption and labeled axes. Photocopies of copyrighted materials are a violation of U.S. copyright laws.

Equations: Equations should be numbered consecutively at the right hand margin.

Page Numbers: Pages are numbered on the bottom center of the page without preceding or trailing characters such as parentheses or dashes. The pages before the introduction are given lower case Roman numerals. The title page is page *i* (but no page number is appears on it), the copyright release form is page *ii*, the abstract *iii*, etc. The first page of the introduction will start the Arabic numbering and should be page 1. The pages of Appendix A should be numbered A1, A2, A3... and Appendix B B1, B2, B3...

Reproduction: Good, clear copies of the thesis are essential. Laser printed pages are preferred, but high quality typing is acceptable. (Dot matrix type is unacceptable.) Photocopies of the original may be used for the remaining copies.

Copies: You will need at least three final copies of your thesis. The original copy is for the library, one is for your advisor, and the remaining one is yours. Additional final copies may be needed for your committee, colleagues, and family members. The library copy must be bound and they can provide you with further information on this process. It is customary to bind your advisor's copy. You may wish to leave your advisor with one unbound copy of the thesis so that copies may be easily made for future students in the lab. The library's copy is bound at no charge to the student. Any additional copy of the thesis that is to be bound requires a \$13 bindery fee, payable at the Bursar.

VI.6 Certification

Students in the Thesis Option program will be certified for their M.S. degrees when the following materials are presented to the Department Head:

- a. Proof of matriculated student status
- b. Proof of successful completion of PPQ exams.
- c. Proof of completion of core and elective courses with a GPA of 3.00 or above
- d. Updated FORM 2 along with a current academic advising report
- e. Completed FORM 7 with the thesis submitted to the library
- f. FORM 8, initiated by the research advisor

VII: NON-THESIS OPTION

The Non-Thesis Option is for students desiring breadth and flexibility in their academic program. Students can fulfill the degree requirements solely through course work, or they can engage in research projects. The research project(s) cannot exceed a total of 8 credit hours and must culminate in a capstone presentation of the project(s) results. Students electing this option may petition to take more than one course from outside the Chemistry Department to broaden the scope of their program. Students may also use industrial projects, or cooperative education experience to complete their M.S. degree requirements within the context of this option. This option is ideal for part-time students, or students wishing to complete a multi-disciplinary M.S. degree.

VII.1 Advisor

Prior to the completion of one quarter of full-time work, or 9 credit hours for the part-time student, students in the non-thesis option must choose a faculty member who will serve as their academic advisor. Upon the student's request, an academic advisor will be selected by the Chemistry Graduate Committee Chair. The selection must be approved by the potential advisor, the Chemistry Graduate Committee and the Department Head. The student and the advisor will then select an appropriate graduate committee, which will act as advisors and evaluators for the student. The graduate committee will have the academic advisor as its Chair, in addition to three other committee members. The committee members could be industrial advisors and/or non-Chemistry faculty. The approval of an academic advisor and the student's graduate committee is documented on FORM 9.

VII.2 Schedule

As soon as an academic advisor has been approved, the student and the advisor will prepare the entire program that will be pursued. FORM 2 is used to list all courses to be used toward the student's degree. It is then submitted by the advisor to the Chemistry Graduate Committee Chair and the Department Head for approval. The student's program must meet the minimum course requirements given below.

A total of 45 quarter credit hours beyond the baccalaureate degree are required to obtain the M.S. degree in Chemistry. Courses for credit in chemistry are chosen from the 600, 700 and 800 numbered courses of the Department. Courses below the 600 level can only be chosen to fulfill the non-chemistry course requirement. No more than 9 undergraduate credits, 600-level or below, can be applied toward the M.S. degree.

Students choosing the non-thesis-option can complete a maximum of 8 quarter credits of SCHC-879: Research and Thesis Guidance. These credits could be divided among more than one project, if the student so desired. Students who are performing their research work at an industrial site should register for up to 8 quarter credits of SCHC-859: Industrial Research. Industrial research can be proprietary within the context of the non-thesis option.

Minimum Course Requirements (Non-Thesis Option)

<u>Category</u>	<u>Credits</u>
Chemistry Courses ^a	27-41
Thesis Research (1010-879) ^b	0-8
Seminar (1010-870)	1
Related, Non-Chemistry Course ^c	3-9
<div style="float: right; text-align: right;">Total 45</div>	

a Includes core requirements

b The maximum total research credits is 8

c Not the most basic, beginning course in the field, but need not be a graduate level course. Advisor approval prior to registration is required.

Students choosing the non-thesis option may elect to take up to 9 quarter credits of non-chemistry course work. If more than one non-chemistry course is taken, the courses should comprise a concentration in a discipline complementary to chemistry. Although undergraduate courses can be chosen, they should not be the most basic courses in the subject area. All non-chemistry courses require the approval of the student's academic advisor.

The following time line should be useful in planning the degree program:

Quarter	Activity
1	PPQ exams, select academic advisor - FORM 9
2	Program of study - FORM 2 Second round of PPQs, if necessary
5*	Literature/Project Seminar - FORM 3
8	Certification of Degree - FORM 8

** before completion of 21 credits*

VII.3 Seminars

As part of the core course requirements, non-thesis-option students must present one public, departmental seminar. Graduate students should register for SCHC-870: Chemistry Seminar in the quarter in which they will present their seminar.

The **seminar** is a one-hour presentation based on a literature topic, or given as a presentation of the results of a research project. Guidance on the selection of a seminar topic may be provided by the student's academic advisor. The seminar must be given within the first 21 credits of the students program. The evaluation of the seminar by the faculty audience is reported on FORM 3.

VII.4 Capstone Experience

The master's degree implies a period of intense study in a specific area. In the thesis option, mastery of the subject area is demonstrated by the written thesis. In the non-thesis option, mastery is also demonstrated by a capstone experience. This culminating work could be the presentation, written or oral, of a research project performed at RIT or in the industrial sector. A report, linking the non-chemistry concentration into the context of chemistry will also be accepted as a capstone experience. The nature of this work will be decided on by the student, the academic advisor, and the student's graduate committee.

VII.5 Certification

Students in the Non-Thesis Option program will be certified for their M.S. degrees when the following materials are presented to the Department Head:

- a. Proof of matriculated student status
- b. Proof of successful completion of PPQ exams.
- c. Proof of completion of core and elective courses with a GPA of 3.00 or above
- d. Updated FORM 2 along with a current academic advising report
- e. Proof of successful completion of the capstone experience
- f. FORM 8, initiated by the academic advisor

INTERVIEWS WITH POTENTIAL RESEARCH ADVISORS

Thesis Option

In order to encourage substantial faculty-new graduate student interaction, you are **REQUIRED** to obtain at least four faculty signatures on the list below. You are **ENCOURAGED** to see many more than four faculty members.

These signatures should indicate that you have conversed with the given faculty member on research topics in their areas of interest. The visits may be as long or as short as agreeable to the parties involved. You may, of course, obtain signatures from those faculty members you have already seen.

When you have chosen your research advisor, return this completed form to the Chair of the Graduate Committee.

FACULTY SIGNATURE

DATE

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Student's Name (Print)

Student's Signature _____

I select the following research advisor _____

Print Name

cc: Dean's Office (Student Personnel File)
Faculty Advisors
Student (Mail Folder)

ROCHESTER INSTITUTE OF TECHNOLOGY
Rochester, New York 14623
Department of Chemistry

FORM 2

TO: CHEMISTRY DEPARTMENT

RE: Program leading to the degree of Master of Science in _____
Department
for _____ in order to
Student Name Student Number
complete the requirements for the degree Master of Science, the Candidate named above must obtain a
satisfactory grade in the following courses:

<u>COURSE NUMBER</u>	<u>COURSE TITLE</u>	<u>CREDIT HOURS</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Thesis Required: Yes _____ No _____ Working Thesis Title is: _____

Working Project Title is: _____

Advisor: _____

Chr. Grad. Co.: _____

Department Head: _____

cc: Dean's Office (Student Personnel File), Faculty Advisor, Student (Mail Folder)

R-I-T

Rochester Institute of Technology



Department of Chemistry
College of Science
85 Memorial Drive
Rochester, NY 14623-5603
(716) 475-2497

OFFICE MEMO

TO: Chemistry Faculty
FROM: Coordinator, Chemistry Seminar
DATE: 10/27/2008
SUBJECT: Seminar Grade For: _____

Please assist in assigning a grade for the Seminar entitled:

_____, which was

presented by _____

on the following date: _____

Faculty Advisor _____

Grade _____

Comments on format, style, audio-visual aids, knowledge, etc. are welcome:

Thank You.

cc: Faculty Advisor, Student (Mail Folder)

**Rochester Institute of Technology
Rochester, New York 14623
Chemistry Department**

Form 4

To: Graduate Committee Chair

Re: Oral Committee

I request that an Oral Committee be appointed for:

Candidate

Student Number

Date

Student's Advisor

cc: Dean's Office (Student Personnel File)
Faculty Advisor

ROCHESTER INSTITUTE OF TECHNOLOGY
Rochester, New York 14623
Department of Chemistry

FORM 5

To: Adviser

The following members of the Institute faculty are appointed to serve on the Oral Committee in charge of the evaluation of:

_____	_____
Candidate	Student Number

for the Master of Science Degree in:

Department

_____, Oral Committee
(Research Advisor)

_____	_____
Date	Chairperson, Graduate Committee

Approved: _____
Department Head

cc: Dean's Office (Student Personnel File)
Committee Members (4)
Student (mail folder)

Rochester, New York 14623
Department of Chemistry

TO: Department Head

The undersigned states that _____
Candidate Student Number

a student in the Master of Science degree program in _____
Department

has taken an interim oral examination.

Evaluation of student by Oral Committee:

Specific Recommendations:

The results were as follows:

Oral Examination

Signature

WRITE IN PASS OR FAIL:

_____	_____
_____	_____
_____	_____
_____	_____

Date

Chairperson, Oral Committee

NOTE: No more than one negative vote is allowed for successful completion.

cc: Dean's Office (Student Personnel File)
Faculty Advisor
Student (mail folder)

Rochester, New York 14623
Department of Chemistry

TO: Department Head

The undersigned states that _____
Candidate Student Number

a student in the Master of Science degree program in _____
Department

has taken an interim oral examination.

Evaluation of student by Oral Committee:

Specific Recommendations:

The results were as follows:

Oral Examination

Signature

WRITE IN PASS OR FAIL:

_____	_____
_____	_____
_____	_____
_____	_____

Date

Chairperson, Oral Committee

NOTE: No more than one negative vote is allowed for successful completion.

cc: Dean's Office (Student Personnel File)
Faculty Advisor
Student (mail folder)

ROCHESTER INSTITUTE OF TECHNOLOGY
Rochester, New York 14623
Department of Chemistry

FORM 7

TO: Department Head

The undersigned state that _____
Candidate Student Number

a candidate for the Master of Science degree in _____
Department

has presented a thesis and has taken a thesis defense examination. Write in PASS or FAIL for thesis and final oral and recommend a letter grade for seminar. Thesis decisions may be deferred.*

<u>Thesis</u>	<u>Final Oral</u>	<u>Seminar Grade</u>	<u>Signature</u>

Rochester Institute of Technology
Rochester, New York 14623
Department of Chemistry

Form 8

TO: Registrar

FROM: _____, Student's Advisor

This is to certify that _____
Candidate Student Number

has satisfactorily completed all the requirements for the degree of Master of Science in

_____ Chemistry _____
Department

Thesis Option



Non-Thesis Option



This includes the successful completion of a thesis entitled: _____

This includes the successful completion of the Project entitled: _____

Date

Chair, Chemistry Graduate Committee

Approved: _____
Department Head, Chemistry

cc: Dean's Office (Student's Personnel File)
Faculty Advisor
Student (Mail Folder)

ROCHESTER INSTITUTE OF TECHNOLOGY
Rochester, New York 14623
Department of Chemistry

FORM 9

To: Advisor

The following professionals are appointed to serve on the Graduate Committee of:

_____ Candidate _____ Student Number

for the Master of Science Degree in _____
Department

_____, Graduate Committee
(Academic Adviser)

_____ Date

_____ Chairperson, Graduate Committee

_____ Department Head

cc: Dean's Office (Student Personnel File)
Committee Members (4)
Student (mail folder)

**TEACHING ASSISTANT
EVALUATION FORM**

Teaching Assistant _____ Date _____

Faculty Evaluator _____

Course (Name and No.) _____

Quarter and year that Course Ran _____

<u>Check List</u>	<u>Excellent</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>No Information</u>
Fairness and Promptness in Grading	_____	_____	_____	_____	_____
Stimulation of Student Interest	_____	_____	_____	_____	_____
Handling of Hazardous Situations	_____	_____	_____	_____	_____
Knowledge of Subject Matter	_____	_____	_____	_____	_____
Reliability in Keeping Office Hours and Appointments	_____	_____	_____	_____	_____
Cooperation with Co-workers	_____	_____	_____	_____	_____

In the space below additional comments can be added. It may be especially important to hear about the relationship of the TA with the students, the TA's general effectiveness, and any particular areas in which the TA could improve. Also, do you have any recommendations or reservations as to future teaching assignments for this person?

(A letter may be added to substitute for or supplement this form).

Faculty Signature _____

Sample Thesis Pages

Title Page

IRREVERSIBLE FIRST ORDER REACTIONS

Susan Queue

June 1995

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Science in Chemistry

Approved: _____
Thesis Advisor

Department Head

Department of Chemistry
Rochester Institute of Technology
Rochester, NY 14623-5603

Table of Contents

Table of Contents

Copyright Release Form	i
Abstractii
List of Figuresiii
List of Tablesiv
Acknowledgmentsv
Introduction	1
Experiments or Methods	
Subheading	20
Subheading	29
Results	
Subheading	45
Subheading	65
Discussion	
Subheading	75
Subheading	100
Conclusions	105
References	106
Appendix A	A1
Appendix B	B1

Copyright Release

Copyright Release Form

IRREVERSIBLE FIRST ORDER REACTIONS

I Susan Queue hereby grant permission to the
Wallace Memorial Library, of RIT, to reproduce my
thesis in whole or in part. Any use will not be for
commercial use or profit.

Signature _____
Date _____

Copyright Release Form

IRREVERSIBLE FIRST ORDER REACTIONS

I Susan Queue hereby grant permission to the
Wallace Memorial Library, of RIT, to reproduce my
thesis in whole or in part. I prefer to be contacted each
time a request for reproduction is made. I can be
reached at:
The Center for Molecular Kinetics
West Lafayette, IN

Signature _____
Date _____