

GRADUATE STUDENT HANDBOOK



UNIVERSITY OF
NORTHERN COLORADO

**Department of Chemistry
and Biochemistry**

GREELEY, CO

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ABOUT THIS HANDBOOK

This handbook is designed to help you, the graduate student, as you work through the requirements for your graduate degree in Chemistry or Chemical Education. The material in this book outlines the important steps, policies, and rules that will be followed. You should also refer to the Graduate School's website for updated information on important dates. In the event of a conflict, the Graduate School's information supersedes this handbook.

A special thanks goes to the University of Michigan for the text of a similar manual that was used as a first draft for this manual.

TABLE OF CONTENTS

Where to go for information	5
<i>Graduate Student Handbook</i>	5
<i>Chemistry Department Website</i>	5
<i>URSA</i>	5
<i>Graduate Mailboxes</i>	5
<i>Research Advisors</i>	5
<i>Graduate Advisor</i>	6
<i>Main Office</i>	6
<i>Department Staff</i>	6
<i>Faculty Listing</i>	6
Graduate Degree Programs	7
<i>Deficiencies</i>	7
<i>General Requirements for Graduate Degrees</i>	8
<i>Qualifier Examinations</i>	8
<i>Program Requirements for the MS (thesis option) Degrees</i>	10
<i>Program Requirements for the MS (non-thesis option) Degrees</i>	10
<i>Program Requirements for the PhD Degree</i>	10
<i>Typical Timelines</i>	11
Literature Seminar Requirements	12
Research or Dissertation Proposal Requirements	13
Research Seminar	13
Comprehensive Examination (MS requirement - thesis and non-thesis)	14
Comprehensive Examination (PhD requirements)	15
The Defense	16
Appeal of “failure”	17
Course Requirements	17
<i>Specific Requirements</i>	18
<i>Chemistry M.S. – Research Emphasis</i>	18
<i>PhD - Chemical Education</i>	22
Graduate Student Advising and Registration	23
<i>Course Listings</i>	23
<i>Grading in Graduate Courses</i>	26
<i>Attendance in Graduate Courses</i>	27
<i>Academic Standing and Probation</i>	27
<i>Choosing a Research Advisor</i>	28
<i>Choosing a Research Committee</i>	28
<i>The Thesis and Dissertation</i>	29
<i>Continuous Registration for Graduate Students</i>	30
<i>Supervised Practicum in College Teaching</i>	31
<i>Deadlines</i>	33

Financial Information	34
<i>Assistantship Support</i>	34
<i>Application for an Assistantship</i>	35
<i>Payment of the Assistantship</i>	36
<i>Tuition Remission</i>	36
<i>Health Insurance</i>	36
<i>Supplementary Income</i>	36
<i>Loans</i>	37
Use of Facilities	37
<i>Keys</i>	37
<i>Building Use Regulations</i>	37
<i>Research Room Use Regulations</i>	38
<i>Classrooms</i>	38
<i>Bicycles, Rollerblades</i>	39
<i>Radios, Music, Movies</i>	39
Research Activities and You!	40
<i>Commitment to the Process</i>	40
<i>Chemistry Research Laboratories</i>	41
<i>Chemical Education Research Room</i>	41
<i>Research with Human or Animal Subjects</i>	41
<i>The Stockroom</i>	41
Ordering Supplies for Research	42
<i>Office Supplies for Research</i>	43
Teaching within the Department	44
<i>Teaching Assistant Responsibilities</i>	44
<i>Permits into Lab</i>	45
<i>Office Supplies</i>	45
Printing and Photocopying for Teaching	45
Printing and Photocopying and Research	46
Printing and Photocopying for Courses	46
<i>Course Numbering System</i>	46
Emergency Information - Chemical Hygiene Plan	47
<i>Response to Building Alarms</i>	47
<i>Response to Other Emergencies</i>	47
<i>Security</i>	47
<i>Safety</i>	48
<i>Maintenance</i>	48
Appendices	49
<i>Qualifier Exam Reporting Form</i>	49
<i>Proposal, Thesis, and Dissertation Cover Sheet</i>	50

WHERE TO GO FOR INFORMATION

Graduate Student Handbook

This handbook is a guide through the rules and regulations that govern the graduate program here in the Department of Chemistry and Biochemistry. You, as a student, must be familiar with these rules. Note, that the majority of these rules are based on those of the Graduate School. Reference to the Graduate School is made throughout this handbook. More information can be found by visiting their website. Of particular interest is the Forms and Deadlines page on their website:

<http://www.unco.edu/grad/forms/index.html>

Chemistry Department Website

The Department maintains a web presence as well. The information found there contains a link to the faculty associated with the Department. In addition, some specific questions associated with applications are answered on the site. The site is modified fairly regularly, so check back often.

<http://www.unco.edu/nhs/chemistry-biochemistry/>

or

<http://depts.unco.edu/chemistry>

URSA

ursa.unco.edu is a valuable tool that you'll use consistently throughout your career at UNC. This data system can be accessed anywhere using your first.last or PDID logon information (depending upon whether you have a teaching assignment or not). Information includes registration for courses, deadlines for some academic things, your transcripts, financial information, etc. Take some time to look over the tabs in URSA and become familiar with finding information.

Graduate Mailboxes

The Department keeps a mailbox for all current graduate students in the Main Office (ROSS 3480). Any mail you receive, and memos, seminar announcements, etc will be placed in your mailbox. Please check these every day - you may miss something very important if you don't.

Boxes for Lab Reports are available for those teaching undergraduate laboratories. These boxes can be used, if you'd like, for the students to return their assignments to you. They are located in the laboratory hallway on 3rd floor. The Stockroom will assign these boxes to you as needed and requested.

Research Advisors

After you have chosen your research advisor, you will work to put together a graduate committee. Please visit with these faculty on a regular basis. They are

extremely helpful and able to provide information about deadlines and helping you stay on track to finish your degree requirements.

Graduate Advisor

The Department has a Graduate Advisor that will serve as your point of contact until you have identified a research advisor. The Graduate Advisor will help you plan the courses you should take to complete your degree and is an excellent resource for academic questions, deadlines, and other information related to the degree requirements. Currently, Dr. Melissa Weinrich (melissa.weinrich@unco.edu) serves as the Graduate Advisor. Her office is in ROSS 3560.

Main Office

The main office in the Department (ROSS 3480) is home to Rosanna Parks, Administrative Assistant, and Dr. Hua Zhao, Chair. These folks can assist with your questions and help point you in the right direction. Please make sure you consult with your advisor, committee, and the Graduate Advisor prior to visiting with the Main Office for any issues or problems. Doing so can avoid problems.

Department Staff

Chair	Hua Zhao
Administrative Assistant	Rosanna Parks
Stockroom Coordinator	Scott Newkirk
Instrument Maintenance	Casey Rodgers, Chad Wangeline

Faculty Listing

Name	Specialty	Room	Phone (351-xxxx)
Apawu, Aaron	Analytical	2590	1282
Barnett, Stefanie	Adjunct Lecturer	3556	
Brown, Corina	Lecturer	3516	1285
Dong, Aichun	Biochem	2576	1286
Hyslop, Richard (Emeritus)	Biochem	3526	1288
Johnson, Alyssa	Adjunct Lecturer	3590	1040
Mosher, Michael	Organic	3590	3257
Pringle, David (Emeritus)	Analytical	3556	1292
Schwenz, Richard	Physical	2580	1287

Suits, Jerry	Chem Ed	3580	1169
Watzky, Murielle	Inorganic	3570	3551
Weinrich, Melissa	Chem Ed	3560	1172
Zhao, Hua	Organic	3480	1443

GRADUATE DEGREE PROGRAMS

The information listed here includes the requirements for all of the graduate degrees offered by the Department. A description of the graduate courses is listed later in this section. Please note that the requirements listed here include Department and Graduate School requirements. Students are urged to consult the Graduate School for up-to-date information on these items.

Department requirements are recommended by the Department's Graduate Committee. This body, a committee of four faculty representing Chemical Education and Chemistry, ensures that the requirements for these degrees adhere to the rules outlined by the Graduate School. Their recommendations are approved by the Department faculty.

Deficiencies

Students may be admitted to a Chemistry graduate degree program with identified deficiencies. These deficiencies are based upon the undergraduate preparation of the student prior to beginning graduate work. All students must have completed the equivalent of an ACS approved degree in Chemistry at the baccalaureate level - as determined by the Department. Specifically, ACS requirements are:

- Analytical Chemistry I
- Biochemistry I
- Inorganic Chemistry I
- Organic Chemistry I
- Physical Chemistry I and II
- Calculus I, II, and III (covering at least differentiation and integration of functions of several variables, vector functions, and parametric equations)
- General Physics I and II (preferably calculus-based)
- And, at least the second semester of three of the four areas (Analytical, Biochemistry, Inorganic, and Organic chemistry)

Any coursework that is missing is denoted in the admission acceptance letter issued by the Department at the time of admission. Students must successfully complete each of the identified deficiencies within 1 year of the date they start their graduate

education in the Department. Failure to do so could result in termination of your program of study. A student may elect to complete any identified deficiencies elsewhere and have them transferred to UNC prior to beginning their graduate career in the Department. Any undergraduate-level course taken to satisfy a deficiency does NOT count toward the graduate degree and will NOT be covered by tuition-remission if the student also has a graduate assistantship.

After consideration of the student's transcripts by the faculty, it is possible that a student may be allowed to complete CHEM 551/552 (Physical Chemistry I and II) and/or CHEM 581/582 (Biochemistry I and II) to satisfy an identified deficiency in either of these two areas. A student will be informed of this decision during the orientation session prior to beginning their graduate career in the Department.

General Requirements for Graduate Degrees

Thesis- and Dissertation-based graduate degrees in Chemistry and Chemical Education are research-based degrees. These degrees are not conferred because of the number of courses you passed, the amount of time you spent in the lab, the number of semesters you were a student, or because the student believes they are finished. The degree is granted based upon evidence presented by a student that shows proficiency and distinctive attainment in the chosen field. At the MS level, the degree is granted by the faculty for "thorough research showing progression to independence and creativity" that is presented with a high degree of communicative skill. At the PhD level, granting the degree requires "demonstration of independent thought, creative scholarship, literary and communicative skills" beyond those at the MS level.

Non-thesis options currently exist for students interested in the MS-Chemistry: Education degree or the MS-Chemistry: Research degree. These degrees are meant to provide the candidate with a very thorough background in either Chemistry or Chemical Education. While not research-based degrees, the non-thesis candidate must still demonstrate that they can independently and creatively apply topics to the application of problems through the coursework that they take. An option to complete a project exists as part of the degree, though the intent of the non-thesis degrees is to provide a solid background in the theory of the topics with limited laboratory experiences. Presentation of a literature review will be completed as part of the non-thesis options.

Qualifier Examinations

The Department administers undergraduate-level exams from the American Chemical Society as qualifier exams. These standardized exams are meant to gauge a student's knowledge of undergraduate-level chemistry content prior to enrolling in graduate-level chemistry courses. All students who are required to take graduate-level Chemistry courses (CHEM prefixes numbered 522 - 590) are required to take qualifier exams. The Department and the Michener Library have resources (e.g.,

ACS study guides, text books) available to assist students in reviewing and studying for these exams. Alternatively, a student's undergraduate textbook and notes from class are good study guides.

Students MUST take qualifier exams in EACH of the five areas of chemistry (Organic, Inorganic, Analytical/Instrumental, Biochemistry, and Physical) until they have been passed or failed at the second offering. The first offering is made in the week(s) prior to the student's first semester; the second offering is in the weeks prior to the next FALL semester after admission.

All qualifier exams will be completed during the two-week graduate student orientation period prior to the Fall semester. A schedule of dates and times for the specific examinations will be distributed by email to all students at least one month prior to the first exam, if possible. No exams may be taken at any time other than the scheduled time. For those students entering graduate studies in the Spring semester, an individualized schedule will be prepared such that the five qualifier exams are offered in the week prior to the Spring semester.

During the final days of orientation, students that were required to take qualifier examinations will meet with either the Department Chair or the Graduate Advisor to discuss the results of the examinations.

A passing mark requires >50% on Biochemistry and Analytical Chemistry exams and >50th percentile on Inorganic, Organic, and Physical exams.

Students who elect NOT to take a particular qualifier examination will receive a Fail for that offering.

Students that fail a qualifier examination, or fail to take the exam, will be presented with an alternative pathway to complete the qualifier examination requirement. That alternative is determined by consultation of the faculty based upon the specific topics that were missed in the examination. The alternative may require the student to:

- a) register for and complete one or both semesters of an undergraduate course with a grade of "B" or better (at the student's expense);
- b) sit in on a portion of the undergraduate course and complete an undergraduate-level examination covering that material with a grade of "B" or better;
- c) or some other requirement used to demonstrate proficiency in that area.

Students that fail to successfully complete an alternative pathway will have one remaining offering in which to retake the qualifier examination (at the next Fall orientation). The results of that second examination are considered final (no further attempts or alternative pathways will be permitted).

If a student does NOT pass the qualifier examination (or the alternative pathway) and has exhausted all of their attempts to do so, the student will NOT be allowed to

take coursework in that sub-discipline of chemistry. Because at least three sub-disciplines of Chemistry must be taken in order to satisfy the requirements for an MS degree in Chemistry, failure to pass at least three qualifier examinations, or their alternative pathways, will result in the student's dismissal from the program.

A summary sheet of all qualifier exam results will be placed in each student's file in the Department. A copy will also be provided to the student's research advisor (if one has been selected), the Department's Graduate Advisor, and are available to any interested faculty member in the Department (for the purposes of determining alternative pathways and registration for courses).

Note: a graduate student will not receive credit toward any graduate degree for any course that is taken in order to make up a deficiency or alternative pathway to complete a qualifier examination (with the exception of CHEM 551/552/581/582). Should a student also have a graduate assistantship, the Graduate School will NOT cover the tuition and fees for these courses.

Program Requirements for the MS (thesis option) Degrees

1. Completion of a minimum of 30 credit hours of coursework and research
2. Minimum 3.00 grade point average overall
3. Completion of a public literature seminar on a non-thesis related topic
4. Completion of a research proposal outlining a literature review of the research topic and the planned methodology
5. Completion of a written comprehensive exam in Chemistry or Chemical Education
6. Completion of a public research seminar on the thesis' research results
7. Approval of the written thesis by the Research Committee and Graduate Dean and a final oral examination by the Committee (Thesis Defense)

Program Requirements for the MS (non-thesis option) Degrees

1. Completion of a minimum of 30 credit hours of coursework
2. Minimum 3.00 grade point average overall
3. Completion of a public literature seminar on a special topic (CHEM 600), or Completion of a written report on a special topic (CHEM 622)
4. Completion of a written comprehensive exam in General Chemistry or Chemistry

Program Requirements for the PhD Degree

1. Completion of a Chemistry (research based) MS degree with thesis

2. Completion of a minimum of 64 credit hours of coursework and research beyond the MS degree
3. Minimum 3.00 grade point average overall
4. Completion of a public literature seminar on a non-dissertation related topic
5. Completion of a research proposal outlining a literature review of the research topic and the planned methodology
6. Completion of a written comprehensive exam in Chemical Education
7. Completion of a public research seminar on the dissertation's research results
8. Submission of at least one manuscript to a research-advisor approved journal for publication
9. Approval of the written dissertation by the Research Committee and Graduate Dean and a final oral examination by the Committee (Dissertation Defense)

Typical Timelines

The typical timelines for completion of the graduate degree requirements are shown below. While “research” may be indicated only in a particular semester following the research proposal, it is more likely that it begins immediately after the successful defense of the research proposal. Note that coursework is taken every semester until that requirement is completed.

Delays in completion of these requirements will delay the completion of the degree requirements. Please see the section on Assistantships.

MS-Chemistry:Research and MS-Chemistry:Education Timeline

Semester	Requirement	Semester	Requirement
1	Plan of Study, Choose advisor/Project, Literature Seminar	2	Select committee, Proposal Defense
3	Research, Written Comp	4	Research Seminar, Defense

MS-Chemistry:Education or MS-Chemistry:Research (non-thesis option) Timeline

Semester	Requirement	Semester	Requirement
1	Plan of Study	2	Literature Seminar

3	Written Comp	4	Finish Coursework
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PhD-Chemical Education Research Timeline

Sem	Requirement	Sem	Requirement
1	Plan of Study, Choose advisor/Project	2	Literature Seminar, Written Gen Chem Comp
3	Select Committee, Written and Oral Comp	4	Proposal Defense
5	Submit manuscript	6	Research Seminar, Defense

Literature Seminar Requirements

The literature seminar serves as the first chance the student has to demonstrate that they can locate information related to a topic, dissect that body of literature articles and other manuscripts for pertinent information, and present the information to the Department in a public forum. Literature seminars are typically 22-25 minutes in length. Literature seminar topics should be approved by the research advisor and the faculty member in charge of the seminar schedule in the given semester.

The literature seminar is constructed with the guidance of the research advisor and must be presented to the research advisor at least 7 days prior to the public presentation. A full abstract (no more than 500 words) with references is required to be turned in to the Main Office and to the faculty member in charge of the seminars during that semester at least 7 days prior to the public presentation. Failure to do either of these items may result in cancelation of your presentation and delays in your graduation.

Often, the topics take the form of a “compare and contrast” or “review” presentation. In the compare and contrast presentation, the student finds multiple viewpoints that support and refute a given topic and then present the summary of those arguments, often including a discussion of the student’s perception of the results. In the review presentation, the student collects, distills, and then presents a summary of a wide body of knowledge related to the topic of the seminar. In neither case is it acceptable that the literature seminar is a report or summary of one or two articles. The literature seminar must show that students can gather a large body of research and distill it to the essential information.

Research or Dissertation Proposal Requirements

The research proposal is begun by visiting with the research advisor. A topic for the research project is then selected upon mutual agreement and some basic information on the topic is related to the student by the advisor. At this point, it is the student's responsibility to research that topic in much the same way as was done for the literature seminar, collecting the body of related work and distilling the important information from it.

The research proposal is then written with guidance from the research advisor. The proposal contains three chapters; Introduction, Literature Review, and Methodology. The introduction must provide an impetus for the research, draw in the reader, and make a specific case as to the purpose for the project. The literature review will then provide background for the project, drawing upon multiple references, and prove to the reader than the research has a likely chance of success. The methodology section, then, outlines the specific project goals and plan of attack. In some cases, specifics for that project are necessary to provide enough detail.

As the research proposal is written with guidance from the research advisor, it is important that they be included in the process. The research advisor should be consulted for editing, specific things to include, and for answering questions as they arise in the process.

The research proposal, once completed, is given to the research advisor for approval. *The research advisor signs the cover sheet (located in the appendix of this handbook) prior to making copies for the research committee.* The proposal defense is then scheduled no less than two weeks after the signed proposal is delivered to the committee members. The committee then meets with the student and discusses the proposed research project, ensuring it can be accomplished in the given timeframe and that it is rigorous enough such that the student can illustrate their independence and creativity during the final defense.

Upon successful defense of the proposal, the student may begin working on the research project. While research may begin prior to the proposal defense, it is wise not to do so in case changes are suggested that would alter the research project.

Research Seminar

The research seminar should be constructed to last 50 minutes (including no more than 5 minutes for questions and answers). The seminar is presented in a public forum after the bulk of the research and analysis of the results has been accomplished. The seminar can be delayed until just prior to the defense, but this is not necessary as the thesis or dissertation does not have to be completed prior to the research seminar.

The research seminar is constructed with the guidance of the research advisor and must be presented to the research advisor at least 7 days prior to the public presentation. A full abstract (no more than 500 words) with references is required to be turned in to the Main Office and to the faculty member in charge of the seminars during that semester at least 7 days prior to the public presentation. Failure to do either of these items may result in cancelation of your presentation.

The topic of the research seminar should emulate the information discussed in the thesis or dissertation. There should be information on the Introduction, Background, Research Plan, Results, Discussion, and Conclusion. Again, specifics for the seminar are available from the research advisor.

Comprehensive Examination (MS requirement - thesis and non-thesis)

The comprehensive examination at the MS level consists of a two-part written examination. It is based on a current literature article in the student's major field of study and on basic knowledge in that same field. It is not required that the student complete any coursework as a pre-requisite to taking the comprehensive exam; however, it is STRONGLY recommended that at least two courses in the field are completed prior to the exam. Students should work, and consult, with their advisor to prepare for the examination.

The comprehensive examination begins by the student announcing to their advisor that they wish to take the examination. The announcement must be made during the first week of the semester in which the examination is taken. Specific dates for the distribution of the exam and date to take the exam will be set during the initial meeting of the student and advisor in the first week of the semester. The student may discuss with their research advisor about taking the examination over the summer. However, exams taken over the summer may only occur at the discretion of the advisor.

The advisor will then prepare the exam and give a copy of the literature article to the student during week three of the semester. The student will then study and take the exam in week five. Should a student miss any of these deadlines, the comprehensive examination will not be scheduled for that semester.

A student that has scored at least 75% on the exam will be judged to have passed the examination. Should a student fail to reach the passing mark on the entire exam, the student will be judged to have failed the exam. The student need not receive a 75% on both sections of the exam; the total score on the exam will be used to determine the passing grade. Failure of the examination can result in one of the three following options, as determined by the advisor and the student's committee: a) the student retakes the exam in the following semester, b) the student is orally quizzed by the faculty members in the same semester, or c) the student is dismissed from the graduate program. Any subsequent attempt (oral or written), if one is advised by the committee, is considered the final attempt to pass the comprehensive examination.

A detailed Department policy on the comprehensive examination can be found in the Policies Manual maintained in the Main Office.

Comprehensive Examination (PhD requirements)

The comprehensive examination at the Ph.D. level consists of a two-part written exam and an oral examination. The written and oral exams are used to demonstrate (1) the student's understanding of general chemistry concepts, and (2) the student's ability to read and understand pertinent chemical education literature, critically evaluate the relevance of the work, and critically evaluate the appropriateness of the methodology used and conclusions drawn by other researchers. Additionally, the student will demonstrate competent understanding of important literature, learning theories, effective teaching methods, and the various research methodologies.

Written Exam Part 1. All students must take this portion of the exam during the Monday a week before the start of the Fall semester. The exam is given in two parts (the ACS standardized final exam for General Chemistry 1 and General Chemistry 2) on the same day. Students may take as long as they wish to complete each part of the examination, but must be finished by 5:00pm. The exams are offered ONLY on the Monday prior to the start of the Fall semester; students are advised to plan their schedule accordingly. Passing marks on this portion of the exam are a 90% (overall) for the two sections of the exam. Failure to take the written examination at the scheduled time is considered a failure of the examination.

Written Exam Part 2. All students must take this portion of the written exam by the end of the fifth week of the fourth semester of enrollment in the program. Exact dates and times will be arranged between the student and the faculty member administering the exam. The student, in consultation with their advisor, must make a formal request to schedule Part 2 of the written exam.

The exam will involve short answer and essay style questions on the subject of Chemical Education. It is not required that the student completes any specific coursework as a pre-requisite to taking Part 2 of the written exam; however, it is STRONGLY recommended that enough courses in chemical education and statistical methods be completed such that the exam is a reflection of the student's competence in these areas. Students should work and consult with their advisor to prepare for the examination. A passing mark on the examination is a "B-" or better.

Oral Exam. All students must take this portion of the exam by the last day of finals week of the fourth semester of enrollment in the program. The student must successfully complete the written exams prior to scheduling their oral exam. The student, based on their research committee's availability, will arrange a specific date and time for the exam. The student must make a formal request to schedule the oral exam with the Graduate School. The student will appear before the committee and answer questions related to any portion of the written examination or any topic related to the field of Chemical Education. A closed-session meeting of

the committee will follow the oral examination. A unanimous vote of “pass” is required to obtain a passing mark for the oral exam.

Failure to obtain a passing mark on any portion of the comprehensive exam will require the student to retake that portion in the immediately following semester before taking the next portion of the examination. That second attempt is scheduled after consultation with the advisor and committee for the student. Failure to obtain a passing mark on the second attempt for any portion of the written examination, or failure to obtain a unanimous vote of “pass” on the oral examination, will result in failure of the comprehensive examination and a recommendation to the Graduate School that the student be dismissed from the program.

A detailed Department policy on the comprehensive examination can be found in the Policies Manual maintained in the Main Office.

The Defense

Candidates for a thesis- or dissertation-based graduate degree in the Department must write and defend a thesis or dissertation on the research that was conducted. More information on the construction of the Thesis or Dissertation can be found later in this manual. The defense of the work is the culminating effort of the student to prove that proficiency and distinctive attainment in the chosen field has been attained. Independent and creative thought should be evident in the defense of the work, as well as the ability to reason and arrive at conclusions based upon empirical evidence.

The regulations governing the preparation of the dissertation are given in the appropriate handbooks found on the Graduate School website:
http://www.unco.edu/grad/new_current/resources/index.html

The subject matter of the dissertation is to be presented at a public Departmental seminar typically in the last term of the student’s residence (see Research Seminar above). The student is responsible for setting up his/her defense as either separate from, or combined with the required research seminar, in consultation with the research advisor and research committee members.

The defense of the thesis or dissertation involves an open meeting that will allow questions and answers from the public or other non-committee members. Following those questions, the committee will meet with the candidate in a closed meeting. All visitors and non-committee members will be asked to leave during the closed meeting of the committee and the candidate. If the research seminar was given on a day other than the day of the defense, the candidate will first provide a brief overview of the research and research results (15-20min). This will then be followed by questions from the advisor and/or committee members. Those questions are NOT limited in their scope and may cover any topic related to the candidate’s

research, coursework, or field of study. A typical defense question and answer period can last up to 2-3 hours.

Following the question and answer period, the candidate will be asked to leave and the committee members will hold a closed meeting to discuss the candidate's defense of the work. A unanimous vote of "pass" is required to receive a passing mark on the defense. Anything other than a unanimous vote of "pass" may result in either a) immediate dismissal from the program; b) a set conditions that must be addressed before a "pass" is achieved; c) a set of conditions that must be addressed before the committee will reconsider their decision; or d) requiring the candidate repeat the defense in a subsequent semester. It is therefore STRONGLY recommended that the candidate work with their advisor to make sure they are ready for the defense prior to scheduling this important examination.

A schedule of deadlines for submitting documentation to the Graduate School is also included on their website:

http://www.unco.edu/grad/new_current/graduation/deadlines.html

Appeal of "failure"

Students who receive a "fail" on a comprehensive examination or a defense may file an appeal with the Graduate School. It is important to note that the actual decision cannot be appealed; only the process in arriving at a decision can be appealed. More information on how to file an appeal and the processes involved can be found by contacting the Graduate School.

Course Requirements

Each graduate degree in the Department requires that students complete a given set of courses and a series of electives. A complete and up-to-date listing of these course requirements is found on the internet at: <http://catalog.unco.edu>

In order to efficiently complete these courses, and to ensure that the courses taken align with the research project that the graduate student will complete, it is important to work closely with the research advisor during advising. No course should be taken without research advisor and graduate advisor approval. For those students on an assistantship, this is particularly important as courses not taken as part of the degree plan are NOT covered by a tuition waiver.

Specific Requirements

Chemistry M.S. – Research Emphasis

Research Credits – 12 hours

CHEM 600 Seminar in Chemistry	2 (1 per seminar)
CHEM 693 Chemical Research	3 – 9
CHEM 695 Thesis Proposal	1
CHEM 699 Thesis	6

NOTE: Students must take CHEM 600 two separate times for one unit each for a total of 2 hours. Students must also take 3 hours of CHEM 693 and complete a total of 6 hours of CHEM 699.

Chemistry Electives — 12 hours minimum

CHEM 522 Advanced Analytical Chemistry	3
CHEM 523 Chemical Spectroscopy	3
CHEM 525 Forensic Chemistry	3
CHEM 533 Organic Synthesis and Stereochemistry	3
CHEM 534 Theory and Mechanisms of Organic Reactions	3
CHEM 543 Organometallic Chemistry	3
CHEM 551 Physical Chemistry I	4
CHEM 552 Physical Chemistry II	4
CHEM 560 Environmental Chemistry	2
CHEM 581 General Biochemistry I	4
CHEM 582 General Biochemistry II	4
CHEM 587 Toxicology	3
CHEM 590 Advanced Topics in Chemistry	3
CHEM 622 Directed Studies	1 – 3
CHEM 693 Chemical Research	1 – 9

Supporting Electives — 0–6 hours

Electives, with the approval of the major advisor, to complete 30 credit hours are required for this program.

Note: In addition to course requirements, all students must successfully complete the defense of a thesis and must complete a comprehensive examination in a major area of chemistry (analytical, biological, inorganic, organic, or physical chemistry).

Chemistry M.S. – Research Emphasis (non-thesis option)

Research Credits – 1 hour minimum

CHEM 600 Seminar in Chemistry	1
CHEM 622 Directed Studies	Or 1

Chemistry Electives — 18 hours minimum

CHEM 522 Advanced Analytical Chemistry	3
CHEM 523 Chemical Spectroscopy	3
CHEM 525 Forensic Chemistry	3
CHEM 533 Organic Synthesis and Stereochemistry	3
CHEM 534 Theory and Mechanisms of Organic Reactions	3
CHEM 543 Organometallic Chemistry	3
CHEM 551 Physical Chemistry I	4
CHEM 552 Physical Chemistry II	4
CHEM 560 Environmental Chemistry	2
CHEM 581 General Biochemistry I	4
CHEM 582 General Biochemistry II	4
CHEM 587 Toxicology	3
CHEM 590 Advanced Topics in Chemistry	3
CHEM 622 Directed Studies	1 – 3

Supporting Electives — 11 hours minimum

At least 11 credits must be taken in ancillary departments such as Biology, Criminal Justice, Earth Science, and Statistics and Research Methods. Consult with your advisor to select appropriate coursework for your particular degree plan.

Note: In addition to course requirements, all students must successfully complete a comprehensive examination in a major area of chemistry (analytical, biological, inorganic, organic, or physical chemistry).

Suggested Supporting Electives for the MS-Chemistry: Research emphasis (non-thesis option)

BAMG 554 Managing and Developing People (3)	GEOL 510 Groundwater Geology (2)
BIO 513 Professional Renewal (1-3)	GEOL 590 Rocky Mountain Geology Seminar (2)
BIO 524 Genomics (3)	SRM 502 Applied Statistics (4)
BIO 525 Molecular Genetics (3)	SRM 520 Introduction to Statistical Computing (1)
BIO 545 Pathogenic Microbiology (3)	SRM 551 Math Stats with Applications I (4)
BIO 550 Cell Physiology (3)	SRM 552 Math Stats with Applications II (4)
BIO 555 Reproductive Developmental Biology (3)	SRM 602 Statistical Methods I (3)
BIO 582 Cancer Biology (3)	SRM 603 Statistical Methods II (3)
CH 500 Stress Management (3)	SRM 609 Sampling Methods (3)
CH 505 Health Communications and the Media (3)	
CH 520 Foundations in Public Health (2)	
CH 550 Environmental Health (3)	
CHEM 510 Green Chemistry for Secondary Educators (3)	
CHEM 682 Problems in Teaching Chemistry (3)	
CRJ 562 Environmental Criminology (3)	
CRJ 565 Transnational Crime (3)	
ESCI 605 Global Change (3)	

Chemistry M.S. – Education Emphasis

Research Credits — 9 hours

CHEM 600 Seminar in Chemistry	2 (1 per seminar)
CHEM 695 Thesis Proposal	1
CHEM 699 Thesis	6

NOTE: Take CHEM 600 two separate times one unit each for a total of 2 credit hours. Students must also take 1 hour of CHEM 695 and a total of 6 hours of CHEM 699.

Chemistry Electives — 6-9 hours

In consultation with their advisor, candidates can select 6 to 9 hours of chemistry elective coursework.

CHEM 522 Advanced Analytical Chemistry	3
CHEM 523 Chemical Spectroscopy	3
CHEM 525 Forensic Chemistry	3
CHEM 533 Organic Synthesis and Stereochemistry	3
CHEM 534 Theory and Mechanisms of Organic Reactions	3
CHEM 543 Organometallic Chemistry	3
CHEM 551 Physical Chemistry I	4
CHEM 552 Physical Chemistry II	4
CHEM 560 Environmental Chemistry	2
CHEM 581 General Biochemistry I	4
CHEM 582 General Biochemistry II	4
CHEM 587 Toxicology	3
CHEM 590 Advanced Topics in Chemistry	3
CHEM 622 Directed Studies	1 – 3

Pedagogy Electives — 12-15 hours minimum

CHEM 682 Problems in Teaching Chemistry	3
SCED 694 Science Education Research	3

NOTE: Take both CHEM 682 and SCED 694. In addition, students should select 6 to 9 hours of appropriate graduate-level courses in supporting areas such as Psychology, Educational Technology, Science Education, Education Foundations, Early Childhood Education, Elementary Education, Applied Psychology and Counselor Education, and Statistics and Research Methods.

Note: In addition to course requirements, all students must successfully defend the thesis and successfully complete a comprehensive examination in chemical education that includes the ACS General Chemistry I and II standardized examinations with a grade of 80% or higher.

Chemistry M.S. – Education Emphasis (non-thesis option)

Required Courses — 7 hours

CHEM 682 Problems in Teaching Chemistry	3
PSY 540 Theories and Principles of Learning	3
CHEM 600 Seminar in Chemistry	1
Or	
CHEM 622 Directed Studies	1

NOTE: Take CHEM 600 or CHEM 622. Students should consult their advisor to choose the appropriate option.

Chemistry Electives— 12 hours

In consultation with their advisor, candidates should select up to 12 hours of chemistry elective coursework.

CHEM 522 Advanced Analytical Chemistry	3
CHEM 523 Chemical Spectroscopy	3
CHEM 525 Forensic Chemistry	3
CHEM 533 Organic Synthesis and Stereochemistry	3
CHEM 534 Theory and Mechanisms of Organic Reactions	3
CHEM 543 Organometallic Chemistry	3
CHEM 551 Physical Chemistry I	4
CHEM 552 Physical Chemistry II	4
CHEM 560 Environmental Chemistry	2
CHEM 581 General Biochemistry I	4
CHEM 582 General Biochemistry II	4
CHEM 587 Toxicology	3
CHEM 590 Advanced Topics in Chemistry	3
CHEM 622 Directed Studies	1 – 3

Pedagogy Electives — 11 hours minimum

In consultation with their advisor, candidates can select at least 11 hours of appropriate graduate-level courses in supporting areas such as Psychology, Educational Technology, Science Education, Education Foundations, Early Childhood Education, Elementary Education, Applied Psychology and Counselor Education, and Statistics and Research Methods.

Note: In addition to course requirements, all students must successfully complete a comprehensive examination in chemical education of the ACS General Chemistry I and II standardized examinations with a grade of 80% or higher.

Suggested Pedagogy Electives for the MS-Chemistry: Education Emphasis (non-thesis)

APCE 566 At Risk Student:Opportunity Strategies (3)	EDEC 620 Educational Applications Child Development Early Childhood Classrooms (3)
APCE 568 Psychology of Women (2)	EDEC 660 Critical Issues in Early Childhood (3)
APCE 602 Foundations of School Counseling (3)	EDEC 670 Curriculum and Instruction in Early Childhood and Primary Education (3)
APCE 616 Career Theory, Counseling Assessment (3)	EDEC 675 Play and Psychosocial Development in Early Childhood (3)
APCE 624 Assessment Treatment Substance Abuse (3)	EDEL 520 Effective Instruction in Elementary School Mathematics
APCE 627 Counselling Interventions Techniques for Talented and Gifted Students (2)	EDEL 612 Elementary School Curriculum (3)
APCE 640 SchoolBased Psychological Consult (3)	EDEL 613 Integrated Curriculum (3)
BAMG 554 Managing and Developing People (3)	EDEL 619 Pluralism in Education (3)
CHEM 510 Green Chemistry Secondary Educators (3)	EDEL 620 Researched Applications for Instruction in Mathematics, K-9 (3)
EDEC 539 Parent Education and Involvement in Early Childhood/Primary (3)	EDF 610 Teacher Research (3)
EDEC 562 Classroom Management in Early Childhood (3)	

EDF 640 Psychological Foundations of Education (3)	PSY 550 Cognitive Development (3)
EDF 662 Foundations of Curriculum Development and Instructional Practice (3)	PSY 575 Educational Assessment (3)
EDF 664 Current Issues in Instruction and Assessment Practices (3)	SCED 540 Secondary Science Methods 1 (2)
EDF 685 Philosophical Foundations of Education (3)	SCED 555 Science Education for Adults &Communities (3)
ESCI 575 Earth Systems Science Education (1-6)	SCED 671 Elementary and Middle School Science Curriculum (3)
ET 347 Educational Technology Applications for Elementary Teaching (1)	SCED 680 Science Curricula HS/College Setting (3)
ET 500 Introduction to Instructional Design and Technology (3)	SCED 694 Science Education Research (3)
ET 501 Introduction to Applications of Educational Technology (3)	SRM 502 Applied Statistics (4)
ET 502 Instructional Design (3)	SRM 520 Introduction to Statistical Computing (1)
ET 503 Computers in Education (3)	SRM 551 Mathematical Statistics Applications I (4)
ET 504 Instructional Materials Design (3)	SRM 552 Mathematical Statistics Applications II (4)
PSY 500 Educational Psychology for Teachers (3)	SRM 602 Statistical Methods I (3)
	SRM 603 Statistical Methods II (3)
	SRM 609 Sampling Methods (3)

PhD - Chemical Education

Pedagogy Component — 13 hours

Required — 10

CHEM 682 Problems in Teaching Chemistry 3

CHEM 755 Supervised Practicum in College Teaching 1-4 (take 4 credits total)

SCED 694 Science Education Research 3

Electives — 3

In conjunction with their advisor, candidates can select graduate-level courses in supporting areas such as Statistics and Research Methods (SRM), Psychology (PSY), Educational Technology (ET), and Science Education (SCED).

Research Component — 51 hours minimum

Research Coursework — 14-17 hours

Required Seminars — 2 hours

CHEM 600 Seminar in Chemistry 1 (take twice; one seminar each on chemical education literature and chemical education dissertation research)

Methodology — 12-15 hours

Required Research Core — 12 hours

SRM 602 Statistical Methods I 3

SRM 603 Statistical Methods II 3

SRM 680 Introduction to Qualitative Research 3

SRM 700 Advanced Research Methods 3

Electives — 0-3 hours

In conjunction with their advisor, candidates can select graduate-level courses in supporting areas such as Statistics and Research Methods (SRM), Psychology (PSY), Educational Technology (ET), and Science Education (SCED).

Required Doctoral Research — minimum 34 hours

CHEM 793 Doctoral Research Practicum-Chemistry 1-9 (take a minimum of 18 hours)

CHEM 797 Doctoral Research Proposal-Chemistry 1-4 (take 4 hours total)

CHEM 799 Doctoral Dissertation-Chemistry 1-12 (take 12 hours total)

GRADUATE STUDENT ADVISING AND REGISTRATION

All graduate students in the Department are required to meet with their advisor to register for courses in the coming semester. A Departmental Registration form (see Appendix) must be completed and signed by the Research Advisor. This form is then taken to the Graduate Advisor for their signature. The role of the Graduate Advisor is to check that the courses selected are adequate for the student at their specific time in the program.

The graduate student is then required to register for the specific courses on the form during the two-day graduate student registration period. Should it not be possible to register for the set of approved courses (time conflict, course not offered, etc.), the student should visit with the Research Advisor and Graduate Advisor (in that order) to choose alternative coursework. The appropriate registration schedule is best examined online for the specific registration dates. These links are to a set location that is updated as the new information becomes available:

http://www.unco.edu/regrec/PDF%20Forms/Registration_Fall.pdf

http://www.unco.edu/regrec/PDF%20Forms/Registration_Spring.pdf

The graduate student then prints a copy of their courses from URSA, attaches it to the Departmental Registration form, and turns this in to the Main Office.

All non-scheduled courses (CHEM 622, 693, 695, 699, 755, 793, 797, or 799) require that the student has obtained a non-scheduled or directed study form, completed it, and had the form signed by the Research Advisor, Instructor (if applicable) and Department Chair. In addition, a Departmental Non-Scheduled Course Syllabus form must be completed by the instructor and signed by the Department Chair. Those forms must also accompany the Departmental Registration Form. There is no need to register in URSA for these courses. The forms submitted to the Main Office will serve as registration for the courses.

It is the student's responsibility to register for courses during the prescribed times. Failure to do so may result in cancelation of a needed course, withdrawal of assistantship support, denial of registration for a non-scheduled course, or other penalty.

Course Listings

Graduate courses offered within the Department are listed here. The Department makes every effort to offer at least two of these courses every semester on a rotating basis.

Pre-requisite courses listed in the descriptions often refer to undergraduate courses (courses numbered 100-499). Successful completion of a BS degree in chemistry prior to enrollment in the graduate program often satisfies these pre-requisites.

CHEM 522 Advanced Analytical Chemistry

Prerequisite: CHEM 321. Advanced topics in analytical chemistry, including sampling, statistics, multiple equilibria and current literature.

CHEM 523 Chemical Spectroscopy

Prerequisites: CHEM 321 and CHEM 332. Theory and application of IR, NMR, UV-visible and mass spectroscopy.

CHEM 525 Forensic Chemistry

Prerequisite: Graduate standing or permission of instructor. Application of statistics and chemistry to the analysis of evidence gathered in criminal investigations such as drugs, fibers, gun shot residue, explosives, and accelerants.

CHEM 533 Organic Synthesis and Stereochemistry

Prerequisite: CHEM 332. An advanced treatment of synthesis and stereochemistry in organic chemistry.

CHEM 534 Theory and Mechanisms of Organic Reactions

Prerequisites: CHEM 332, CHEM 452. An advanced treatment of organic reaction mechanisms and molecular orbital chemistry.

CHEM 541 Solid State Chemistry

Prerequisite: CHEM 442 or equivalent. Bonding and crystal structure, crystallography, synthesis and characterization techniques, and structure-property relationships unique to solid-state materials.

CHEM 543 Organometallic Chemistry

Prerequisite: CHEM 441. An introduction to organometallic systems will be presented. Included will be a comprehensive study of the preparation, properties and practical utility of both main-group and transition metal organometallic compounds.

CHEM 551 Physical Chemistry I

Prerequisites: CHEM 332, MATH 233, PHYS 241. Co-requisites, CHEM 321. Chemical kinetics, quantum theory of atoms and molecules and statistical thermodynamics.

CHEM 552 Physical Chemistry II

Prerequisite: CHEM 551. The properties of matter, thermodynamics, thermochemistry and kinetic molecular theory.

CHEM 556 Physical Chemistry of Atomic and Microscopic Systems

Prerequisites: CHEM 451 and CHEM 452. This course will examine the details of atomic and molecular structure, energetics, and dynamics.

CHEM 560 Environmental Chemistry

(1.5 lecture,.5 laboratory) Prerequisite: CHEM 331. The effect of chemicals on the environment.

CHEM 581 General Biochemistry I

Prerequisite: CHEM 332 or equivalent. Chemistry of biologically important compounds (proteins, nucleic acids, carbohydrates and lipids), emphasizing structure and function, methods of isolation, identification and characterization, kinetics and mechanisms of enzyme catalysis.

CHEM 582 General Biochemistry II

Prerequisites: CHEM 581. A continuation of CHEM 581. Bioenergetics, electron transport systems, metabolism of carbohydrates, lipids, nucleotides and amino acids.

CHEM 587 Toxicology

Prerequisites: CHEM 482 or equivalent. A descriptive examination of the toxic effects of environmental substances on living systems.

CHEM 590 Advanced Topics in Chemistry

Discussion of a topic in chemistry at the graduate level; e.g. polymers, drug metabolism, and molecular reaction dynamics. Repeatable, maximum of 12 credits, under different subtitles.

CHEM 600 Seminar in Chemistry

Oral report and discussion on an advanced topic in chemistry or chemical education. Repeatable, may be taken three times.

CHEM 622 Directed Studies

Individualized investigation under the direct supervision of a faculty member. (Minimum of 37.5 clock hours required per credit hour.) Repeatable, maximum concurrent enrollment is two times.

CHEM 682 Problems in Teaching Chemistry

Problems encountered in teaching chemistry and approaches to their resolutions will be considered. The formal nature of concepts, management of laboratories, safety, demonstrations are illustrative of areas of discussion.

CHEM 693 Chemical Research

Develop, complete, and defend master's level research project in chemistry. S/U graded. Repeatable, unlimited credits.

CHEM 695 Thesis Proposal

The student will develop a committee approved research proposal based on current literature.

CHEM 699 Thesis

Required of candidates in M.S. Research emphasis program. Repeatable, maximum of 6 credits.

CHEM 755 Supervised Practicum in College Teaching

Supervised practice in college teaching for doctoral candidates with observation used as a basis for analysis of learning experiences. Repeatable, maximum of six credits.

CHEM 793 Doctoral Research Practicum-Chemistry

Consent of advisor. Provides experience in the development and implementation of research techniques, the development of experimental design and the analysis of research data. S/U graded. Repeatable, unlimited credits.

CHEM 797 Doctoral Research Proposal-Chemistry

Required of all doctoral students. Students may register for this course (1-4 hours) in any semester, but must earn 4 hours of credit in partial fulfillment of requirements before admission to candidacy. S/U graded. Repeatable, maximum of four credits.

CHEM 799 Doctoral Dissertation-Chemistry

Required of all doctoral candidates. See Ph.D. in Chemical Education - Minimum requirements for the major in the Graduate School section of this Catalog. Repeatable, maximum of 12 credits.

Grading in Graduate Courses

The University operates on a 4.00 +/- grade point system, utilizing both letter grades and S/U grades. Graduate courses do include many courses that are graded with S/U and NR grades. A description of these grading systems and the result on your GPA is outlined below.

The course syllabus you will obtain on the first day of the course contains important information regarding course requirements and the grading system utilized. It is your responsibility to read the syllabus and consult the instructor if you have any questions. The syllabus is your contract with the instructor for the course, and should be consulted if there are questions about the operation of the course.

A minimum 3.0 GPA in any Chemistry graduate program is required.

Letter grades in the Department of Chemistry are limited to the full letter; no “+” or “-” is awarded in chemistry courses. Thus, an “A” letter grade corresponds to 4.0 GPA points per credit hour, a “B” to 3.0 GPA points per credit hour, a “C” to 2.0 GPA points per credit hour, etc...

A “S” grade is given for students that have achieved satisfactory performance in the course as outlined in the course syllabus. No GPA points are assigned to these courses and an “S” does not change your GPA, but the credits are used toward completion of the degree requirements.

A “U” grade is given to students that have not achieved satisfactory performance as outlined in the course syllabus. A “U” grade does not change your GPA, but the credits will not be counted toward completion of degree requirements.

A “UW” indicates an unauthorized withdrawal and is assigned only when you never attended the class for which you enrolled. While a “UW” doesn’t impact your GPA, it is recorded on your transcript and the credits are not counted toward the degree.

A "W" indicates an approved withdrawal from the course and is assigned only when you have completed the official withdrawal process.

A "NR" is used for courses that have been granted approval for "NR" grading, specifically theses, dissertations, and other courses that have been granted approval for "NR" grading at the graduate level. The "NR" is assigned when the coursework requires longer than a semester to complete. The "NR" will be replaced by the appropriate grade when the work is completed. If the work is not completed in a timely fashion, it can roll into a "U" or "F" depending upon the course. Once "NR" grades have rolled to an unsatisfactory/failing, grade changes will not be permitted.

Attendance in Graduate Courses

Regular attendance in all classes is assumed. Each instructor determines the relationship between class attendance, the objectives of the class and the student's grade. The instructor is responsible for informing students of attendance policies and the effect of attendance on their grade. The student is responsible for knowing the policy of each course in which he or she enrolls. Note that some instructors will issue a failing grade for students that have more absences than the number of credit hours for the course.

Attendance during the first two class sessions is required. The instructor has the option to drop a student from class if he or she does not attend the first two hours during which the class meets, in order to allow other students to enroll. Once notified by the instructor, the Registrar's Office will contact the student to confirm non-attendance. The student will be issued a drop by the instructor from the course if prior to the drop deadline for the given term or issued a grade of UW if after the drop deadline for a given course. Not all instructors will exercise this option; therefore, a student should not assume that non-attendance will automatically drop him or her from class.

Academic Standing and Probation

All graduate students in the Department must maintain adequate progress toward the degree at all times. This includes timely completion of degree requirements, such as the Literature Seminar, and good academic standing within the coursework required for the degree.

A graduate student may not graduate with a cumulative grade point average below 3.00. If a student's cumulative grade point average drops below 3.00 after taking at least 9 graduate level credit hours, a warning letter will be sent to the student by the Graduate School. The student will be dismissed from the degree program if the student's grade point average is below 3.00 after completing an additional 9 or more graduate level credit hours in which grades of "A," "B," "C," "D," or "F" are earned. All grades earned during the semester that the 9th hour is earned are used in the calculation of the grade average.

Choosing a Research Advisor

The student and the Research Advisor are jointly responsible for fulfilling the Departmental and Graduate School requirements for the Ph.D. degree. The Advisor's responsibilities begin at the time of his/her agreement to accept the student into his/her group. In addition to supervising the research, the Research Advisor is expected to guide the student on course elections, examinations, independent study pertinent to his/her general development as a scientist, and any other matters affecting his/her general progress toward a degree.

It is STRONGLY suggested that all new graduate students visit with at least three faculty members in the Department prior to selecting a research advisor. Asking questions, learning about available research projects, typical expectations of graduate students, and other items are worth learning prior joining a research group. Once the research advisor is chosen, by mutual agreement, it is the responsibility of the student to inform the Graduate Advisor and the Department Chair. Failure to do so may result in delays in assistantship assignments, delays in completing requirements, and general delay in completing the degree requirements.

Choosing a Research Committee

Just as much care in choosing a Research Advisor should be taken when you choose the members of your Research Committee. Consultation with your Research Advisor should help guide the selection of the members of your committee.

Each master's student who will be writing a thesis must have a thesis committee of at least two members from within the Department. The thesis committee must be comprised of faculty members who have Doctoral Research, Graduate Faculty or Graduate Lecturer status.

Each doctoral student must have a Research Advisor and a doctoral committee appointed before the written comprehensive exam is taken. The appointment of the Doctoral Committee shall occur prior to the scheduled comprehensive examination and prior to registering for any CHEM 797 hours.

At minimum, a doctoral committee must consist of:

- a) a Research Advisor from within the Department area who also holds Doctoral Research [DR] status;
- b) one additional faculty Committee Member from within the Department;
- c) one additional faculty Committee Member from within a related discipline or area of inquiry (or from within the Department);
- d) a Faculty Representative (needs to be outside the program discipline)

All committee members must have at least Graduate Faculty (GF) status. The Doctoral Committee is subject to the approval of the Graduate Advisor and the Graduate School. The student and all members of the Doctoral Committee will

receive confirmation of the approved committee assignments. Unless the student or Research Advisor informs the Graduate School or the Graduate School informs the student of the need for a change, the doctoral committee membership will remain the same from the written comprehensive examination throughout the dissertation research stages of the program (it is possible to have a committee involved in the comprehensive examinations that is different from the Research Committee that evaluates the Dissertation defense).

An Honorary member is not required on the committee, but is allowed when an off campus faculty member with research expertise related to the study is requested. The Honorary committee member is a full voting member with all the rights and responsibilities of other members of the committee and must be present at the student's doctoral oral examination and dissertation defense.

The Thesis and Dissertation

The thesis and dissertation are constructed from the data obtained in a research project under the guidance of the Research Advisor. Working closely with the Research Advisor will reduce many of the headaches and issues during the construction of the document.

These documents are not only a record of the work you completed in the attainment of the graduate degree, they serve to illustrate the proficiency, independence, and creativity you achieved during the program. These are legal documents bound by the rules and codes of ethics associated with the American Chemical Society or other appropriate governing body. As such, there are specific issues associated with these documents:

- a) while the student is the initiating author of the document, the student is NOT the sole author, nor is the student a controlling author of the document or the information contained within;
- b) a student may NOT abstract, excerpt, publish, or in any way copy the research idea, data, thesis or dissertation text without the express consent of the Research Advisor (in some cases this extends beyond the Research Advisor to other contributors to the data or text of the document);

Data related to the graduate research project is not solely controlled by the student. Other people were likely involved in the production of that data and collectively have a say in its use. Of primary importance is the original owner of the research idea, the Research Advisor. Only in rare cases does the Research Advisor not have a controlling interest in the data or research idea obtained in a research project.

There are two options for the construction of a thesis or dissertation. The first option is the Graduate School specific format - data on which chapters must be included in this format are found on the graduate school website.

The second option is known as the Chemistry Department Specific format. In this option at least one (1) chapter is a manuscript in the thesis and two (2) chapters are manuscripts in the dissertation. The format for the thesis or dissertation must follow the American Psychological Association (APA) format, will have chapter specific numbering for tables, figures, and equations (e.g., Figure 1.1, 2.1, 3.1), and will have all references compiled in a single section after the last chapter. An example of a Chemistry Department Specific Dissertation table of contents is shown here:

Chapter 1 – Introduction and overview of the research (sections as appropriate for the chapter)

Chapter 2 – Literature Review (sections as appropriate for the chapter)

Chapter 3 – Methods (sections as appropriate for the chapter)

Chapter 4 – Title for Manuscript 1 (sections as appropriate for the chapter)

- Title
- Abstract
- Introduction (literature review)
- Materials and Methods
- Results
- Discussion

Chapter 5 – Title for Manuscript 2 (see above)

Chapter 6 – The overall results (including addressing the research questions proposed in Chapter 1), implications, and future research should be summarized in this chapter.

References

Appendices (as needed)

- IRB and consent form/s (if applicable)
- Copyright permission (if applicable)
- Supporting data files (if applicable)

Any deviation from these formats must be agreed upon by you, your Research Advisor, and the Graduate School.

Continuous Registration for Graduate Students

All Doctoral students are required to register continuously from the time they first enroll in their graduate degree program until the semester or term in which they graduate. Doctoral students must be enrolled for at least 1 credit hour each academic semester (fall and spring) to be in compliance to this policy. Those doctoral students not in compliance with the continuous registration policy will automatically be assessed the \$150 continuous registration fee each semester.

All Doctoral, Specialists, and Master's students must also register for at least 3 semester hours the semester (or summer term) in which they take examinations (including written and oral comprehensive examinations or approved equivalent and dissertation defenses) and the semester (or summer term) in which they graduate.

Transfer of credit from other institutions will not be considered in lieu of continuous registration.

Beginning Fall 2011, students who fail to register continuously for one year will be notified with a letter of warning. At the beginning of the fourth semester of non-enrollment the student will be classified as inactive. Inactive students will need to re-apply to the Graduate School, be re-accepted by their program and the Graduate Dean, and pay \$150 continuous registration fee if they wish to resume their studies. Acceptance is not guaranteed. Additional coursework and examinations may be required for students who are reactivated.

Supervised Practicum in College Teaching

The objectives of this course are considerably different from other graduate courses. A description of the requirements, responsibilities, and process of completing CHEM 755 is thus, necessary to aid students in this part of the doctoral program. The main objective of the course is to assist doctoral students in becoming effective college level instructors through practical and relevant supervised teaching experiences. The course is offered on an individual basis and is customized to meet the needs of each student.

Students will complete one semester hour of this four semester hour requirement during a Planning Semester immediately prior to teaching and the remaining three semester hours during the Teaching Semester. Students must have passed at least one written comprehensive examination prior to the Teaching Semester. The course is graded "S/U" basis.

Planning Semester:

The student prepares goals for supervised teaching and identifies the course(s) appropriate for meeting those goals. Meeting with their Research Advisor, and Committee if appropriate, will determine the course for the supervised practicum.

The student meets with the instructor of record (IOR) for the course to request sponsorship and to initiate the collaboration during the Planning and Teaching Semesters. The student observes classes in the course for a minimum of two weeks and meets with IOR to plan the duties of each during instruction of the course.

Student assembles a portfolio containing items such as the following:

- a) Syllabus co-written by student and IOR
- b) Rational for syllabus, including objectives for topics to be taught by student
- c) A copy of the survey form to be used and mid-semester teaching evaluation.
- d) Outlines of first three lectures, including demos, applications, and examples
- e) Lab syllabus, list of materials required, and instructor keys
- f) Copy of the ACS Division of Chemical Education Minimum Safety Guidelines for Chemical Demonstrations
- g) Selection of literature reprints chosen by the student

The student and IOR review the laboratory syllabus, materials list, and instructor keys. At the end of the Planning semester, the IOR evaluates the readiness of the

student instructor. The IOR has final say in whether the student is ready to teach the course. Should a student not be ready, the Teaching Semester will be delayed.

Teaching Semester:

It is recommended that the student have responsibility for teaching half of the class meetings of the course. If at all possible, an initial two week block, then a block lasting four or more weeks, including writing and grading an exam over the material presented should be part of the assignment. The student must present preparatory notes for each class and exam questions to the IOR for approval.

Feedback on the student's performance can be obtained after the first two week teaching block by providing a teaching evaluation survey to the students. The specific questions can be determined by the IOR and practicum student.

The student should observe classes taught by the IOR in the selected course, meet before each class with the IOR when teaching class, and inform their Research Advisor in writing of student teaching dates.

At the end of the Teaching Semester, the student should add items such as the following to the teaching portfolio:

- a. Weekly brief self-analysis of teaching
- b. Written comments from faculty observers
- c. Class notes, handouts, overhead transparencies, demonstrations, etc., for two class meetings
- d. Course exams written by student instructor
- e. 2-5 page reflection of experience
- f. Summary of final student evaluations (on special student practicum form)
- g. Interim and final evaluations from IOR

The IOR should provide feedback on the teaching after each session. That feedback may include videotaping the class sessions. Any teaching strategies, pedagogies, or other hints should be provided to assist the student in improving their teaching ability.

Finally, the IOR will submit a written final evaluation to the student and Research Advisor that will include a critique of the student's work and a summary of the comments of any other observers. Based on that evaluation, the IOR will assign a grade for the teaching practicum.

Deadlines

University of Northern Colorado Three Year Calendar				
All posted deadlines are for full-semester courses. For other courses, please see the Special Term/Short Course Calendar.				
Fall Semester				
	2018	2019	2020	2021
Schedule on the Web/PIN's available	Tues, Feb 20	Tues, Feb 19	Tues, Feb 25	Tues, Feb 23
Registration Opens (See Schedule)	Mon, Apr 2	Mon, Apr 1	Mon, Apr 6	Mon, Apr 5
Residency Petition Deadline	Mon, Aug 6	Mon, Aug 12	Mon, Aug 17	Mon, Aug 16
Residence Halls Open	Thur, Aug 16	Thur, Aug 22	Thur, Aug 20	Thur, Aug 19
Classes Begin	Mon, Aug 20	Mon, Aug 26	Mon, Aug 24	Mon, Aug 23
Add Deadline	Fri, Aug 24	Fri, Aug 30	Fri, Aug 28	Fri, Aug 27
Labor Day Holiday (University Closed)	Mon, Sept 3	Mon, Sept 2	Mon, Sept 7	Mon, Sept 6
Drop Deadline	Fri, Aug 31	Mon, Sept 9	Fri, Sept 4	Fri, Sept 3
Grade Replacement Application Deadline	Fri, Aug 31	Mon, Sept 9	Fri, Sept 4	Fri, Sept 3
Graduation Fair	Thurs, Oct 18	Thurs, Oct 17	TBD	TBD
Individual Course Withdrawal Deadline	Thurs, Oct 11	Thurs, Oct 17	Thurs, Oct 15	Thurs, Oct 14
Complete Schedule Withdrawal Deadline	Tues, Nov 13	Tues, Nov 19	Tues, Nov 17	Tues, Nov 16
Thanksgiving Holiday (No classes)	Wed-Sun, Nov 21-25	Wed-Sun, Nov 27-Dec 1	Wed-Sun, Nov 25-Nov 29	Wed-Sun, Nov 24-Nov 28
Thanksgiving Holiday (University Closed)	Thurs-Sun, Nov 22-25	Thurs-Sun, Nov 28-Dec 1	Thurs-Sun, Nov 26-Nov 29	Thurs-Sun, Nov 25-Nov 28
Final Exam Week	Mon-Fri, Dec 3-7	Mon-Fri, Dec 9-13	Mon-Fri, Dec 7-11	Mon-Fri, Dec 6-10
Cap and Gown Distribution	Fri, Dec 7	Fri, Dec 13	Fri, Dec 11	Fri, Dec 10
Incomplete grade change deadline	Wed, Dec 18, 2019	Wed, Dec 16, 2020	Wed, Dec 15, 2021	TBD
Graduate Commencement	Fri, Dec 7	Fri, Dec 13	Fri, Dec 11	Fri, Dec 10
Undergraduate Commencement	Sat, Dec 8	Sat, Dec 14	Sat, Dec 12	Sat, Dec 11
Residence halls close at 10:00 am	Sat, Dec 8	Sat, Dec 14	Sat, Dec 12	Sat, Dec 11
Fall Final Grade Deadline (5 pm)	Wed, Dec 12	Wed, Dec 18	Wed, Dec 16	Wed, Dec 15
Transcripts available with final grades	Mon, Dec 17	Mon, Dec 23	Mon, Dec 21	Mon, Dec 20
Course and Program Curriculum Deadlines	Mon, Dec 31	Tues, Dec 31	Thurs, Dec 31	Fri, Dec 31
Transcripts available with final degree	Tues, Jan 22	Tues, Jan 21	Tues, Jan 19	Tues, Jan 18
Diplomas available with final degree	Tues, Feb 5	Tues, Feb 4	Tues, Feb 2	Tues, Feb 1

Spring Semester				
All posted deadlines are for full-semester courses. For other courses, please see the Special Term/Short Course Calendar.				
	2019	2020	2021	2022
Schedule on the Web/PIN's available	Tues, Sept 4, 2018	Tues, Sept 10, 2019	Tues, Sept 8, 2020	Tues, Sept 7, 2021
Registration Opens (See Schedule)	Mon, Nov 5, 2018	Mon, Nov 11, 2019	Mon, Nov 9, 2020	Mon, Nov 8, 2021
Residency petition deadline	Mon, Dec 24, 2018	Mon, Dec 30, 2019	Mon, Jan 4	Mon, Jan 3
Residence Halls Open	Fri, Jan 4	Fri, Jan 10	Fri, Jan 8	Fri, Jan 7
Classes Begin	Mon, Jan 7	Mon, Jan 13	Mon, Jan 11	Mon, Jan 10
Add deadline	Fri, Jan 11	Fri, Jan 17	Fri, Jan 15	Fri, Jan 14
Martin Luther King Day (University Closed)	Mon, Jan 21	Mon, Jan 20	Mon, Jan 18	Mon, Jan 17
Drop deadline	Fri, Jan 18	Mon, Jan 27	Mon, Jan 25	Mon, Jan 24
Grade Replacement Application Deadline	Fri, Jan 18	Mon, Jan 27	Mon, Jan 25	Mon, Jan 24
Graduation Fair	Wed-Thur, Feb 20-21	Wed-Thur, Feb 19-20	TBD	TBD
Faculty/Narrative Catalog change deadline	Fri, Mar 1	Mon, Mar 2	Mon, March 1	Tues, March 1
Individual Course Withdrawal Deadline	Mon, Mar 4	Mon, Mar 9	Mon, Mar 8	Mon, Mar 7
Spring Break (No Classes)	Sat-Sun, Mar 9-17	Sat-Sun, Mar 14-22	Sat-Sun, Mar 13-21	Sat-Sun, Mar 12-20
Complete Schedule Withdrawal Deadline	Fri, Apr 12	Fri, Apr 17	Fri, Apr 16	Fri, Apr 15
Final Exam Week	Mon-Fri, Apr 29-May 3	Mon-Fri, May 4-8	Mon-Fri, May 3-7	Mon-Fri, May 2-6
Cap and Gown Distribution	Thur-Fri, May 2-3	Thur-Fri, May 7-8	Thur-Fri, May 6-7	Thur-Fri, May 5-6
Incomplete grade change deadline	Wed, May 13, 2020	Wed, May 12, 2021	Wed, May 11, 2022	TBD
Graduate Commencement	Fri, May 3	Fri, May 8	Fri, May 7	Fri, May 6
Undergraduate Commencement	Sat, May 4	Sat, May 9	Sat, May 8	Sat, May 7
Residence Halls Close at 10:00 am	Sat, May 4	Sat, May 9	Sat, May 8	Sat, May 7
Spring Final Grade Deadline (5 pm)	Wed, May 8	Wed, May 13	Wed, May 12	Wed, May 11
Transcripts available with final grades	Mon, May 13	Mon, May 18	Mon, May 17	Mon, May 16
Transcripts available with final degree	Mon, Jun 10	Mon, Jun 15	Mon, Jun 14	Mon, Jun 13
Diplomas available with final degree	Mon, Jun 24	Mon, Jun 29	Mon, Jun 28	Mon, Jun 27

FINANCIAL INFORMATION

Assistantship Support

The Department has a select number of Graduate Assistantships that it may elect to award to qualified graduate students. The conditions of the appointment to a Graduate Assistantship are governed by the agreement that each recipient is required to sign before acceptance of the position. In order to remain qualified to be considered for an appointment, the graduate student MUST:

- a) attend the annual graduate student orientation held by the Department and by the Graduate School
- b) maintain good academic standing (>3.0 GPA cumulative)
- c) be registered for a minimum of 3 graduate credit hours in each semester of the appointment. For masters there is no minimum requirement for enrollment in the summer. Students on fiscal year teaching agreements must enroll in one unit over the summer and be enrolled for no more than three consecutive sessions (this means take summer units during the same summer session each year such as Summer Session I).
- d) maintain adequate progress toward the completion of the degree through completion of comprehensive examinations, seminars, etc in a timely fashion
- e) maintain productive standing as recommended by the research advisor
- f) adequately perform the duties associated with receipt of the assistantship (e.g., be present for all scheduled office hours, work toward improving instruction as evidenced by student evaluation of teaching data, be punctual for all scheduled meetings, return student work in a timely fashion, adhere to all safety rules, etc...)

Graduate students will normally be considered for a Graduate Assistantship for a maximum of three years at the MS level and for a maximum of four years at the PhD level. Note, however, that the award of an assistantship to a graduate student is at the discretion of the Department and support beyond the present semester is neither guaranteed nor implied.

The appointment normally requires teaching six to eight workload hours per semester (i.e., three or four laboratories or the equivalent). Each semester, the assignment will be distributed to the graduate students, and a faculty coordinator for that position will be assigned. It is the responsibility of the holder of an assistantship to meet with their coordinator PRIOR to the start of the semester in order to determine the specific duties associated with the position.

The teaching workload, including actual contact time, preparation, grading, attending staff meetings, holding office hours and similar duties, equates to approximately 20 hours per week on average across the semester.

As such, **all students holding an assistantship of any kind are REQUIRED to be physically present within the confines of the Department spaces for a minimum of 20 hours a week.** Courses that a student is currently taking do NOT count toward that minimum of 20 hours a week. If a student wishes to “work from home”, they may do so, but that time also does NOT count toward the minimum 20 hours within the Department. The requirement applies to the University determined dates that it is “open” for Fall and Spring semester for Academic Year assistantships, and to the entire year for Fiscal Year assistantships (less recognized holidays).

Students on Academic Year assistantships are only required to be present within the Department during the academic year, as defined by University “open” dates. As such, students with these positions may take as much vacation time (outside of the Academic Year) as they wish. **Up to one week of vacation time** during the Academic Year is allowed without prior approval from the Research Advisor and/or Department Chair. Note: even though classes may not be in session, students holding an assistantship should still be present. *If the campus is open, those with an assistantship should be present.* Taking the week of Spring Break as vacation counts as the week of vacation time. The days between the end of the Fall semester and the start of the Spring semester are similarly counted as vacation days. Students that take more than 1 week of vacation without approval will lose their assistantship for the rest of the academic year - and be required to reapply for an assistantship in the following academic year.

Students on Fiscal Year assistantships may take **up to two (2) weeks per year** as vacation. Note that absence during Spring Break, the Interim Session, or any other dates where the University is open COUNT toward the 2 weeks of vacation; days that the University is closed *may* be taken as vacation without counting toward the total of two weeks. If a student wishes to take more than 2 weeks of vacation in a given year, they **MUST** obtain prior approval from their Research Advisor and the Department Chair. Taking more than 2 weeks of vacation without approval will result in loss of the assistantship.

Students may elect to be released from the assistantship duties. This is done by writing a formal letter to the Department Chair and copying the Research Advisor.

Application for an Assistantship

Normally, applications for an available Graduate Assistantship are considered when a student applies for admission to the program. However, an admitted student without an assistantship can apply to the Department in order to be considered. Assistantship applications are typically considered in February, July and September of each year for the following semester. To apply, a qualified student (see above) must submit a formal letter to the Department Chair by the

first day of February, July, or September. Application for an available assistantship does NOT imply that one will be awarded.

Payment of the Assistantship

The assistantship pay is delivered electronically to your bank account at the end of each month. The monthly pay for those on fiscal year appointments is the total salary divided by 12. The monthly pay for those on academic year appointments is the total salary divided by 10. Thus, those on academic year appointments are not paid at the end of June or July, nor are those students required to be present on campus in June or July.

Tuition Remission

Students on an assistantship also have tuition remission for those graduate courses directly related to the completion of their specific degree. That tuition remission applies ONLY to graduate courses taken while the assistantship is active. Note, a student transitioning from academic year support to fiscal year support is normally NOT covered during the first half of the summer session, and must pay tuition for any graduate course taken during that transition.

Tuition remission does NOT apply to undergraduate courses required due to a deficiency or identified during the qualifier examination process.

Health Insurance

Undergraduate students enrolled for 9 or more credit hours and graduate students enrolled for 6 or more credit hours will automatically be enrolled in the UNC Student Health Insurance Plan. If the student wishes to waive the UNC plan, they will need to complete an online waiver form in URSA and provide the requested information to show coverage with comparable insurance coverage by the 10th day of classes. More information can be found in the online Graduate Catalog.

Supplementary Income

Appointment to a half-time assistantship or to an equivalent fellowship is intended to provide sufficient financial support to enable a student to devote the other half-time (assuming a full week of work is full-time) to his/her graduate program. Consequently, a condition of the appointment is that no outside employment be undertaken other than tutoring during the appointment window (fiscal year versus academic year). In conditions of unusual financial stress, such as may result from extra dependents or special circumstances, the student should discuss additional employment options with his/her Research Advisor and the Department Chair.

Loans

Loan funds administered through the Office of Financial Aid are available to meet the needs of any educational expense for students while enrolled in the University. The extent of this financial need must be clearly established by providing a complete statement of the applicant's financial resources and expenses for the academic year.

Loans are NOT available for any non-educational expense which is normally financed by a commercial lending institution, nor are they available for the repayment of previously incurred indebtedness. Short term loans are considered by the Office of Financial Aid.

USE OF FACILITIES

Keys

Keys are issued to all graduate students based upon the requirements associated with their specific assignment. Keys are obtained by completing a Key Request Form located in the Main Office. After signature from the Department Chair, the form is taken by the student to the Lock Shop (Parsons Hall) where it is signed and a key issued. Do NOT sign the form until you pick up the keys in Parsons Hall.

Having a key carries with it the following implications:

- a) keys may not be copied
- b) keys are not to be loaned to other students
- c) key holders are not to allow admission of non-key holders to a room; except in the case of undergraduate students' access to a teaching laboratory
- d) keys are to be returned to the Lock Shop when the student leaves the program, by graduation or other reasons
- e) lost keys are to be reported to the Main Office immediately

Building Use Regulations

Ross Hall is open most of the calendar year (except for State and Federal holidays) with the doors opening around 6:30am and closing around 10:30pm every day. Graduate students may request admission to the building outside of the times that the building is unlocked. Upon approval of the Research Advisor, the Department Chair will notify the Lock Shop to issue card-swipe access to Ross Hall.

Students with card-swipe access to Ross Hall must not allow anyone without card-swipe access to enter the building when it is locked. Students inside the building when it is locked must maintain a professional decorum, all safety rules, and adhere

to any directions provided by campus security or other persons of authority. Failure to do so could result in loss of card-swipe access.

Campus security may perform a walk-through of the building during the hours it is locked. All students must adhere to any directions given by campus security; if they request that you leave the building, you must do so.

During the times that Ross Hall is open, all students have access to the building and the Department. It is imperative, then, that ALL rooms with restricted access (research and teaching labs, cold room, chemical storage rooms, etc) remain LOCKED at all times. Propping a door open or leaving a door unlocked to a restricted access room is not appropriate.

Research Room Use Regulations

The entry and use of a research room is governed by the Department's Chemical Hygiene Plan. This document is found in the Department Main Office and on the website for the Department.

No person is allowed access to a research room unless they have completed Hazard Communication training for that academic year and signed the Chemical Hazard Training form. Graduate students receive that training during the Orientation session each year. Undergraduate students receive that training during the first day of undergraduate laboratory coursework and during the first meeting of any undergraduate research program. Faculty and staff receive training during the annual Department Retreat.

Persons found within laboratories that have not completed the training will be asked to leave and, if a graduate student, will lose any assistantship for the semester in which they have violated this provision.

Periodically, the Department and others may provide a tour of the building and its facilities. These untrained personnel are allowed temporary (less than 10 min) access to restricted spaces if they are appropriately dressed (long pants, closed toe shoes) and wear goggles while in the laboratory space. Under no circumstances is it appropriate for a visitor to remain in the restricted space for more than 10 minutes, or to be allowed access to that space without a Hazard Communication trained escort.

Classrooms

All classrooms in Ross Hall are unlocked prior to the first class of each day and locked after the last class of each day. Occasionally, the room is found locked when it should be unlocked. If this is the case, the room can be unlocked by calling the Main Office. On the second occurrence, the Department can issue card-swipe access to specific rooms.

The primary use of classrooms is for holding classes. Students that wish to gain access to practice a seminar presentation may use those classrooms if they are empty (no class in session). Scheduling a classroom is required prior to its use. The Main Office will be happy to schedule the room for such a purpose. Note that due to Ross Hall room usage, it may not be possible to find a free room during a requested time.

Classes have a 15 minute transition period prior to and after each class. Instructors may enter the classroom 7 minutes prior to the start of the class and must vacate the room no later than 7 minutes after the class time. The room should be returned to the state they were in prior to the start of class; whiteboards cleaned, trash picked up, lost items collected and turned in to the Main Office, etc.

Bicycles, Rollerblades

Under no circumstances should bicycles, rollerblades, or related items be used within the building. Storage space for bicycles can be found adjacent to the entrances for Ross Hall.

Radios, Music, Movies

Radios, music and other sound-generating equipment are acceptable for use in research laboratories. However, at all times, any sound-generating equipment must be kept at a sufficiently low volume so that they do not become a nuisance both within the room where they are being used and outside of the room. Similarly, conduct in the building should be such as not to interfere with classes or research activities in progress. Ross Hall is a place for study and research. Conditions which interfere with these objectives should not be allowed to develop.

RESEARCH ACTIVITIES AND YOU!

Research is fun. It is challenging, fulfilling, and even fun if approached with the proper attitude. Many of the projects pertain to areas that are, to date, not well understood; consequently, the outcome of each project cannot be foreseen. Many techniques require diligence, patience and repetition. Many experiments will not work with the first few attempts; some may even give unexpected results.

Research is education. Graduate degrees in chemistry and chemical education are research degrees for a reason. We don't just learn by doing, we learn how to learn by doing. By the end of your graduate career, you'll know how to learn about a topic, set up a research project, disseminate the results, and draw connections between your topic and where it fits in the broader base of knowledge.

In order to get to that point, it is expected that graduate students will have apprenticed enough within their research project to demonstrate independence, creativity, and technical competence in their field. This implies that a research project will last longer for some graduate students than it will for others.

Commitment to the Process

It is not only expected, but imperative, that all students involved in research demonstrate a strong commitment and sense of responsibility toward their research projects. Progression toward the benchmarks the faculty set for MS and PhD graduates in independence, creativity, and technical competence requires concerted and continual effort. In fact, a dedicated effort on your research project is often the only way to move toward the goal of the graduate degree.

Successful completion of a research project requires considerable library and laboratory work. With few exceptions, a master's level project typically requires much more than 1000 hours from conception to completion, (1000 hours is approximately 20 hours per week, every week, for a year); a doctoral project can take multiples of that 1000 hours to complete (we've all heard the tales from professors that worked in the lab 80 hours a week for three or more years without a vacation in order to obtain their degree - speaking from experience, the tales are entirely true).

In the end, your graduation from the program is not related to how many credit hours you have amassed or how many hours you've spent in the lab. It is considered by your Research Advisor when an appropriate amount of productive time has been invested in your project, such that your Research Advisor and your Research Committee can see that you have developed a level of independence, creativity, and technical competence that is commensurate with the degree for which you are working to obtain. Success can be expected only with this level of commitment. In other words, your advisor and your committee are responsible for determining when your project has been completed and when you can move forward toward the defense of your research project.

Your research advisor will probably tell you this as well; it is important that while you conduct research in the lab, that you also spend time honing your understanding of the current literature in your field of study. This may mean spending an hour or more each week finding, reading, studying the literature in the library. The best way to get a handle on this is to schedule that time during the week. Realize, however, that this shouldn't detract from time in the lab or in your other endeavors.

Chemistry Research Laboratories

The laboratories are for research only. Visitors are NOT allowed into research laboratories (except in the case of tours as noted in the section on Safety). In any case, ALL personnel in a laboratory are held to the same safety guidelines and practices, including the use of safety goggles, protective clothing, etc.

Except for temporary (less than a few minutes) visitors on a tour, no one is allowed into the research laboratories unless they have completed safety training. There is no exception to this rule.

Chemical Education Research Room

The Department houses a Chemical Education Research Room with an attached interview room fitted with an eye-tracker. Use of this room and the equipment follows the same type of rules as does the Chemistry Research Laboratories. Students are not allowed access or use of the room without proper training and approval from the Chemical Education faculty.

Research with Human or Animal Subjects

The Department is dedicated to the highest standards of research integrity. The university's guidelines and procedures promote those standards in the care for people and animals that are the subjects of research, as well as in maintaining confidentiality, adhering to protocols, and preventing research misconduct. You can learn more about the internal review board (IRB) and the Institutional Care and Use Committee (IACUC) at <https://www.unco.edu/research/research-integrity-and-compliance/>. If conducting research with humans or animals, failure to follow approved IRB or IACUC protocols will result in failure from the program.

The Stockroom

The Department houses a Chemical and Equipment Stockroom that is supported solely from student generated laboratory fees. The equipment, glassware, supplies and chemicals in the Stockroom serve only one process; these keep the undergraduate laboratories operational. Any supplies that you need for your research project must be maintained separately from the Stockroom supplies.

In some cases, the Stockroom may be able to supply minor items for use in research. However, these items are charged back to the Research Advisor and the funds from that transfer are used to resupply the Stockroom.

Nothing in the stockroom is “free”.

Ordering Supplies for Research

If you need supplies for a research project, there is a well-established process for obtaining them. Unfortunately, this process takes at least a few days, so please plan ahead for any needed items. Note that your emergency in obtaining an item for research is NOT an emergency to anyone else. So, plan ahead.

Steps for ordering supplies are outlined here. Failure to follow these steps IN ORDER can result in a delay in your receipt of the needed supplies:

1. Obtain a Department Purchase Requisition form from the Main Office.
2. Determine the supplies that are needed by consultation with your Research Advisor and indicate those on the form.
3. Determine the supplier (Fisher Scientific, VWR, Aldrich, etc...) and identify the cost of the items. Currently, Fisher is a preferred vendor. It is worth considering “hazard charges” for particularly hazardous materials such as butyllithium, and “shipping charges”.
4. Determine the source of funds that will cover these charges. Your Research Advisor will indicate the source of funds on the form by writing down the account number. Your Research Advisor will also sign the form to indicate their approval.
5. Obtain the Department Chair’s signature on the form. Note, the Department Chair will verify that the specified account has the requisite funds needed to purchase the items. Note, this may take up to two days to get processed in the Main Office.
6. Do not expect to have the order form signed immediately. Its best to leave it in the Chair’s mailbox.
7. If the account specified can fill the order, the Department Chair will deliver the form to the Stockroom for ordering. The stockroom will notify the Research Advisor when the items arrive; often within 2-3 days for normal shipping (but this can take a week to a couple months depending on where the item is coming from, if it is backordered, etc.).
8. If the account does not have the needed funds to fill the order, the Department Chair will return the form to you with a “insufficient funds” note on the form. Visit with your Research Advisor to find alternative funds for the purchase.

Note: the University is currently limiting purchases of “technology-based” items such as computers, iPads, video cameras, etc... The Research Advisor can still request these items by adding a written formal request, with supporting reasons for the purchase, to the Department Chair. It will take 1-2 weeks to receive these items from the date of the Research Advisor’s letter - assuming the purchase is authorized by the administration in Gunter and Carter Halls.

Failure to follow these steps can significantly delay the order. For instance, if no account for payment of the order is identified, the order form will be returned with the “insufficient funds” note.

Office Supplies for Research

Office supplies are meant solely for the operation of the Department in its mission to educate undergraduate and graduate students. Office supplies such as paper, binders, pens, and file folders are not “free” if their purpose is to support your research or your personal coursework (see below for the 1 exception). If you need these items for your research project or personal coursework, please inform Rosanna Parks in the Main Office. All expenses will be charged to your Research Advisor and will require approval from your Research Advisor prior to you obtaining the supplies.

The one exception to this rule: the Department will supply a laboratory notebook for your research project free of charge. However, the laboratory notebook must be returned to your Research Advisor at the end of your graduate career. You are NOT allowed to keep that notebook without prior written consent from your Research Advisor.

TEACHING WITHIN THE DEPARTMENT

Teaching assignments are given to those graduate students with assistantships. These assignments are not typically available for graduate students without an assistantship.

Teaching Assistant Responsibilities

All students assigned to teach courses within the Department are held to the same standards as the faculty of the Department. The assignment to educate students is NOT to be taken lightly. The faculty place tremendous value the quality of the educational experience we provide to our students. Failure to maintain that level of quality not only reflects poorly on the Department, but it reflects poorly on the teaching assistant. If the quality of your teaching is poor or not showing signs of improvement, it could result in loss of the assistantship.

You should take pride in the quality of work that you perform and in the image as a chemist and a teacher that you convey to others. As a professional in training, you are also obligated to the terms of your annual contract. This includes the type of duties you are to perform and the time frame in which those duties are to be performed. If there are any questions concerning these arrangements, you should consult with the Laboratory Coordinator for the course(s) you are teaching.

Meetings with your Laboratory Coordinator will be held weekly at a time arranged by the Laboratory Coordinator – attendance is mandatory. Be prompt for T.A. meetings and prepared to participate in the discussion of the details of the laboratory activities. Missing one meeting is unacceptable, missing more than one will seriously jeopardize your continued employment with an assistantship.

Your class presentations must be well prepared; your Laboratory Coordinator will likely help you prepare the lesson, or at least give you specific topics that must be presented in your lesson. It is also important that you are very familiar with the experiment that the students will be doing in lab. Therefore, all teaching assistants MUST personally perform each experiment PRIOR to the meeting of your laboratory section. A portion of the T.A. meetings will be devoted to discussion of what to expect with each experiment.

When conducting a class, you should be dressed appropriately, with goggles in place. As a professional, fraternization with and patronage toward students is considered dereliction of duty. Students in your lab are very aware of any favoritism and are ruthless on evaluation day if they notice anything related to it.

There is always too much information to disseminate to the students on the first day of class. However, that first day can run smoothly if you have adequately prepared your lesson. Organize your presentation thoughtfully and work from a script if necessary. This will help you optimize your time and reduce confusion.

Strict adherence to the safety policies (goggles, appropriate attire, etc) is to be enforced by the teaching assistant. You MUST lead by example. And note that any issues in this area by the students in your charge will result in punishment of the teaching assistant and NOT the undergraduate student. Be in command during the lab and make sure your students are following the rules. Don't assume that because you're in lab, no one will notice that a particular student is wearing shorts, or that another student doesn't have goggles. Big brother is watching and will catch the issue.

At the end of the semester, and at other times as requested by the Laboratory Coordinator, you will turn in the grading sheet that you have used to record grades. The Laboratory Coordinator will verify that the grades are consistent across all sections and return a modified grade sheet to you. It is your responsibility to enter the modified grade into the URSA grading system.

Permits into Lab

A common issue involves students interested in “switching” lab sections or trying to join a lab section. This must be done in URSA following the rules placed on us by the registrar’s office; it cannot be done by any other means. If a student appears in your lab section asking to switch or add the lab section, the student should be immediately directed to the Main Office or the Lab Coordinator’s office to initiate the change. Similarly, if you have a student in your lab that does not appear on your roster, send them to the Main Office for confirmation that they belong in that lab. Do not allow students that are not on your class rolls to attend, participate, or even visit your lab.

Office Supplies

Any office supplies that are needed for teaching within the Department are available to the instructors and TAs free of charge. If you need a pad of paper, pens, markers, etc., they are available for you. As noted elsewhere, office supplies for research or classes you are taking are not free of charge. You must pay for these items as they are specific to your graduate education instead of your job as a teaching assistant. Because of the multiple uses of office supplies, it is important for you to keep these supplies separate in your office.

Printing and Photocopying for Teaching

Printers, attached to computers, are available for use in your teaching assignment in the main GA/TA office. Photocopying is also available in the Main Office.

The Administrative Assistant will provide you with a code number for use on the Department photocopier and will train you in the operation of the photocopier. Please note that the photocopier is not to be used outside of the hours of the Main Office (typically 8am - 5pm) unless you have received permission to do so. Note that

the Main office is unlocked at 8am and is locked at 5pm Monday through Friday. If you need photocopies in the morning at 8am, its best to obtain them the day before.

Printing and Photocopying and Research

You may print and photocopy items for use in research as long as they are returned at the end of your graduate career. The Department will cover the expense of these items. If they will not be returned, the cost is \$0.05 / copy to your Research Advisor or to you.

Department rules dictate that ONE (1) copy of your proposal, thesis, or dissertation may be made at no cost. Any other copies (including drafts) will be charged and must be prepaid.

Printing and Photocopying for Courses

Any printing or photocopying needed for a course a student is taking must be paid for by the student. The cost for these copies is \$0.05 / copy. For example, if an instructor in one of your classes tells you to find an article and provide copies for the whole class, you must cover the cost of this yourself.

Course Numbering System

The Department operates its courses with a unique section identifier. The section number is three digits long. For example, CHEM 111L-128 or CHEM 111L-003.

The first digit of the section number is:

- 0 - lecture section
- 1 - first section of lab at the indicated time
- 2 - second section of lab at the indicated time

The second digit indicates the day of the week that the class/lab is taught:

- | | |
|-----------------------|-------------------------|
| • 0 - lecture section | • 5 - Friday |
| • 1 - Monday | • 6 - Saturday |
| • 2 - Tuesday | • 7 - Monday, Wednesday |
| • 3 - Wednesday | • 8 - Tuesday, Thursday |
| • 4 - Thursday | |

The last digit indicates the starting time of the class/lab. Start times for labs are shown here. (Each starting time in a day is given a number from 1-9):

- 2 - 8:00am
- 5 - 11:00 or 11:15am
- 8 - 2:00 or 2:30pm
- 9 - 6:00pm

EMERGENCY INFORMATION - CHEMICAL HYGIENE PLAN

In case of emergency, the chemical hygiene plan dictates the procedure of action. It is everyone's responsibility to read and know the procedure of action for each type of emergency. If in doubt, the Stockroom and / or Main Office should be immediately notified for guidance on what to do.

Response to Building Alarms

The building has been equipped with an automatic dual detection system which has both heat and smoke sensors. The systems may be activated by either type of sensor or by the manual operation of the lever at any of the standard red alarm boxes. Upon activation of the system, warning horns sound continuously and the Department of Public Safety responds by dispatching a campus police officer to investigate the cause of the alarm and by contacting the fire department, if necessary.

If the alarm sounds, it should be treated as a real emergency. Follow the procedure of action relevant to the specific situation in which you find yourself. The alarm indicates that the typical conditions of a fire have been detected in the building.

Failure to leave the building when the alarm sounds is irresponsible and could be considered dereliction of duty. This could result in dismissal from the program for failure to adhere to safety rules.

Response to Other Emergencies

Other emergencies are possible, such as a tornado warning, active shooter in the building, etc. The Department has created action plans for each of these emergencies. It is the responsibility of everyone in the Department to follow these procedures quickly and adhere to directions from Department-appointed wardens during the emergency. Copies of the emergency plans are found in the appendix of the Chemical Hygiene Plan.

Security

The Chemistry Building contains a large amount of dangerous and/or flammable substances and also a great deal of expensive and delicate equipment. It is therefore particularly vulnerable to petty thievery and to attempts at malicious mischief. Strangers, and particularly youngsters, can seriously injure themselves by wandering into hazardous areas. For these reasons, doors to individual office and laboratories should always be locked.

If persons are found in areas where they appear to have no business, they should be questioned and directed to the location they are seeking. If they seem to have no valid reason for being where they are, they should be ushered out courteously but firmly. Campus security may be called if the situation warrants their assistance.

The campus police department also has a list of people that are not allowed on campus. This list, known as the PNG (persona non grata) list, is available in your URSA account. If you notice a person on campus that is on the PNG list, it is your duty to immediately contact campus police and inform them of this.

Safety

The general accepted safety principles and practices for the department and specifically, for individual research laboratories are contained within the Chemical Hygiene Plan and Standard Operating Procedures. Copies of these documents should be located in each laboratory and a master copy is found in the Main Office. Familiarization with the contents of this safety manual is REQUIRED of anyone working in the Department laboratories.

Safety goggles are required to be worn in all laboratories, instrument rooms, chemical storage rooms and other areas where hazardous work is being performed. Contact lenses are STRONGLY discouraged when entering a laboratory area.

Maintenance

All maintenance items such as lights out, malfunctioning switches, plugged sinks, leaking faucets, etc., should be reported to the Main Office for maintenance or repair. Floods, due to overflowed sinks, etc., should also be reported immediately to the Main Office.

Any instrument maintenance should be reported to your Research Advisor. The Research Advisor will make the call to either do the repair themselves or report it to the Main Office.

APPENDICES

Qualifier Exam Reporting Form

Qualifier Exam Report

Student _____

Program _____

Advisor _____

Admit Semester _____

Student Signature _____

By signing, I agree that I have discussed the results of Exam 1 and been informed of the Alternative Action to completing the Qualifier Examinations.

Student Signature _____

By signing, I agree that I have discussed the results of Exam 2.

Exam	Exam 1 Score	Alternative Action	Exam 2 Score
Analytical			
Biochemistry			
Inorganic			
Organic			
Physical			

- A circled “P” in the Exam column indicates that the Qualifier Exam has been passed.
- An “X” in the Exam column indicates that the Qualifier Exam has been failed in the final attempt. The student may not register for graduate coursework in that subdiscipline.

Proposal, Thesis, and Dissertation Cover Sheet

COVER SHEET

TITLE OF DOCUMENT: _____

GRADUATE STUDENT: _____

DATE: _____

By signing the cover sheet below, I acknowledge that I have worked with the graduate student listed above on the preparation, construction, and editing of the attached document. This document reflects the advice, edits, and recommendations that I have provided to the student.

RESEARCH ADVISOR: _____

DATE: _____