

Handbook
for
Chemistry Graduate Students

2020-2021 Edition

Department of Chemistry

College of Arts and Sciences

The University of Tennessee at Knoxville

2. Table of Contents

1. Cover Page	1
2. Table of Contents	2
3. Introduction	3
Graduate School Introduction	3
Introduction to Chemistry Handbook	3
Chemistry Department Administration	4
4. Admission Requirements and Academic Procedures	4
Admission Requirements	4
Admission to the Department of Chemistry	5
Application Procedures	5
Admission Classifications	6
English Certification	9
Transfer Credit	10
Change of Programs	10
5. Financial Support	10
Preamble	10
Definitions	11
Types of Assistantships	11
Work Assignments and Related Factors	12
Tutoring	13
Outside Employment	13
Full Time Status	13
Maximum Time Period for Assistantships	14
Qualifications of Graduate Assistants	14
Competency in English	14
Rights/Responsibilities of Graduate Assistants	14
Fellowships	16
6. Degree Requirements, Registration and Advising	16
Requirements for Degrees	17
Diagnostic Exams and Qualifying Courses	17
Initial Advising	17
Coursework and selection	18
Courseloads	18
Selection of Major Professor	19
Initiation of Research	20
First Year Evaluation	20
Summer Registration	21
Progression to PhD Candidacy	22
Selection and Composition of the Graduate Committee	22
Candidacy Research Proposal (CRP) Exam	23
Third Year Seminar	25
Original Research Proposal (ORP) Exam	25
CRP and ORP Scores	26
Annual Evaluation of Graduate Students	26
Performance Below Expectations	26
Publication Requirement	27
Thesis and Dissertation	27
Final Oral Examination and Defense	28

7. Standards, Problems and Appeals	29
Academic Standards	29
GPA Maintenance	29
Dismissal	30
Research Data and Storage	30
Academic Honesty	30
Plagiarism	31
Petitions	31
General Process for Appeals	31
Appendix 1 Information on Diagnostic Examinations at Entrance	33
Appendix 2 Chemistry entry in the Graduate Catalog 2020-2021	35
Appendix 3 Forms Used by graduate Students and Important Websites	43

3. Introduction

Graduate School Introduction

In order to serve the mission and vision of the Graduate School and preserve the integrity of Graduate Programs at the University of Tennessee, Knoxville, information related to the process of graduate education in each department is to be provided for all graduate students.

Based on Best Practices offered by the Council of Graduate Schools, it is important that detailed articulation of the information specific to the graduate degrees offered in each department/program be disseminated.

The Department Graduate Handbook does not deviate from established Graduate School Policies <http://catalog.utk.edu/index.php?catoid=7> noted in the Graduate Catalog, but rather provides the specific ways in which those policies are carried out.

Introduction to Chemistry Handbook

The information in this booklet is offered to assist Chemistry graduate students in planning a clear path toward a graduate degree. It is not all inclusive and the concerned student also must consult more complete sources of information such as the Graduate Catalog, Graduate School publications, and the plethora of web sites now available at UT.

Another particularly important resource is the Graduate Assistant Handbook prepared by the graduate school. <http://catalog.utk.edu/index.php?catoid=15>

Graduate students are expected to be aware of and satisfy all regulations governing their work and study at the university.” Students should be directed to the Graduate Catalog, to *Hilltopics*, and to the publications on the Appeals Procedure and the Graduate Assistant Handbook available on the Graduate School website:

(<http://gradschool.utk.edu/GraduateCouncil/AppComm/AppealProcedureApproved2009.pdf>)

The first part of this guide attempts to present topics in the order in which a new graduate student typically needs the information. Some of the pertinent material from the Graduate Catalog is included for easy reference. The complete Graduate Catalog should also be consulted.

Several appendices accumulate more detailed information on topics important to earning a degree and examples of some Graduate School forms.

A companion publication, which is available through the Department of Chemistry website, provides additional information about the departmental personnel, facilities, and infrastructure.

We hope this is of use and welcome comments for improvement.

Chemistry Department Administration

Viktor N. Nemykin, Department Head (Buehler 552, vnemykin@utk.edu)

Shawn R. Campagna, Associate Department Head for Graduate Programs (Buehler 552, campagna@utk.edu)

David M. Jenkins, Associate Department Head for Undergraduate Programs (Buehler 409, davidjenkins@utk.edu)

Michael D. Best, Director of Graduate Studies (Buehler 667, mdbest@utk.edu)

Main Office Supervisor: Rhonda Wallace (Buehler 552, rhonda@utk.edu)

4. Admission Requirements and Application Procedure

Enrollment in the graduate program in Chemistry at the University of Tennessee at Knoxville requires admission to both the Graduate School and the Department of Chemistry. The procedures for applying to both programs are described below.

Admission requirements

Admission to graduate study requires a bachelor's degree with a satisfactory grade point average from a college or university accredited by the appropriate regional accrediting agency or foreign equivalent. The Graduate Council requires a minimum grade point average of 2.7 out of a possible 4.0, or a 3.0 during the senior year of undergraduate study. Applicants with previous graduate work must have a grade point average of 3.0 on a 4.0 scale or equivalent on all graduate work. Many programs require a higher average. Applicants with work experience or who are entering graduate study after a number of years away from an educational institution, usually five years, will be given consideration with greater flexibility relative to GPA. An international student graduating from a United States institution must meet the same requirements as those for domestic students.

An applicant whose GPA falls between 2.5 and 2.7 may be admitted on probation, upon recommendation of an academic unit. The probationary status will be removed after completion of 9 or more hours of graduate credit with a minimum GPA of 3.0. Failure to maintain a 3.0 while in this status will result in dismissal. An international student may not be admitted on probation.

The stated criteria are the minimums. The actual averages required for admission may be higher, depending on the number and the qualifications of applicants. When a student is admitted to graduate study prior to having received the baccalaureate degree, that degree must be awarded before the date of first registration in graduate courses.

The Office of Graduate Admissions must be notified of any change in the entering date after admission has been granted. Individual departments and colleges may have further restrictions on admission dates. For this information, students should contact the department they wish to enter. If a student does not enroll within one year after the requested admission, the application process must be repeated.

Enrollment in graduate programs is a privilege which may be withdrawn by the university, or any area of graduate study, if it is deemed necessary by the Dean of the Graduate School to safeguard the university's standards.

Admission to the Department of Chemistry

Admission to the Department of as a graduate student is decided on a case-by-case basis, taking into consideration an applicant's undergraduate record (traditionally including courses in general, analytical, inorganic, organic, and physical chemistry), performance on the general Graduate Record Examination (required), and supporting information such as references from previous faculty and research mentors, co-authorship of research presentations or papers, and awards.

Application Procedures

Anyone with a bachelor's degree from a regionally accredited institution or foreign equivalent who wishes to take courses for graduate credit, whether or not the person desires to become a candidate for a degree, must submit a formal online application for admission to graduate study or apply for transient status. No action is taken until a file is complete. An applicant will be notified once action has been taken by the department/program and the Office of Graduate Admissions. Applicants may check their status online.

To apply for admission to the UTK Graduate School, the following materials must be submitted to Graduate Admissions.

- The completed online Graduate Application for Admission (<http://graduateadmissions.utk.edu/>).
- A \$60 non-refundable application fee. (This fee may be waived in certain cases. Please see the UTK Chemistry website for details.)
- One official transcript from all colleges and universities attended.
- Scores from Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) if native language is not English (refer to section on English Certification).

For applying to the Department of Chemistry, all details regarding application procedures can be found at the following website:

<https://www.chem.utk.edu/applynow>

To register for the IELTS, contact IELTS at <http://www.ielts.org>.

To register for the GMAT, go to the GMAT website at <http://www.mba.com/>.

To register for the GRE and TOEFL, contact

Educational Testing Service

Princeton, New Jersey 08450

<http://www.ets.org>

The ETS UT code is 1843. Test results reach the university in approximately three weeks.

All documents submitted become the property of the university and will not be returned. For international graduate student application procedures, see Admission of International Students.

Admission Classifications

Degree Admission

Admission to a degree program requires that a person meet the minimum admission requirements and any additional program requirements (see Admission Requirements). Refer to the appropriate department for specific requirements for admission to the degree program.

In addition to meeting the minimum requirements, applicants at the doctoral level must have demonstrated a potential for superior academic performance. Criteria considered are performance in prior undergraduate and/or graduate studies, achievement on graduate admission tests, letters of recommendation from professors familiar with the applicant's capabilities, and other evidence of scholarly achievement.

A student must maintain a 3.0 grade point average to continue enrollment in a degree program (see Academic Standards).

An applicant may not be admitted simultaneously to more than one degree program. Two or more applications cannot be considered concurrently. For admission to dual programs, applications are processed consecutively.

Non-Degree Admission

Applicants may apply for non-degree status who, for example

- Need additional time to fulfill application requirements for a degree program.
- Do not wish to pursue a degree program.

Minimum requirements (see Admission Requirements) must be met for admission to non-degree status. Some departments do not permit non-degree students to register for graduate courses.

A major must be declared if the intent is to seek an advanced degree. If no degree is desired, a major need not be declared. Students anticipating long-term enrollment as non-degree students are advised to apply as undergraduate students in non-degree status. Students holding a degree who are taking additional work as undergraduate non-degree students may be allowed to take 600-level courses for undergraduate credit with the approval of the instructor.

Before accumulating 15 hours of course work in graduate non-degree status, the student must apply and be admitted to a specific degree program. To change your status from non-degree to degree seeking, complete and submit form [Change of Graduate Program](#) to continue enrollment.

A maximum of 15 graduate hours may be taken in graduate non-degree status. If admitted into a degree program, no more than 15 graduate hours may be applied toward a graduate degree, if approved by the student's committee. Courses applied toward any graduate degree must fall within the time limit specified for the degree.

Non-degree graduate students do not have academic advisors since they are not affiliated with an academic unit and faculty. Non-degree graduate students may consult the director of graduate studies in the appropriate academic unit(s) for course options.

A student must maintain a 3.0 grade point average to continue enrollment in non-degree status (see Academic Standards).

Admission to non-degree status does not constitute admission to a degree program. The student who seeks to enter a degree program will be directed to the appropriate department.

An international student on a student visa may not enroll as a non-degree student, except for students admitted through a reciprocal exchange program. International exchange graduate students who seek admission to UTK as non-degree students are subject to Graduate School policies affecting non-degree students. Additional information about exchange student status is found in these policies under the heading of International Exchange Graduate Students.

Graduate Certificate

Admission to a graduate certificate program requires that a person meet the minimum admission requirements and any additional program requirements (see Admission Requirements). Refer to the appropriate department for specific requirements for admission to the certificate program.

Admission to a graduate certificate program does not constitute admission to a degree program. To receive a graduate certificate, students must be admitted to a certificate program or a degree program.

Transient Admission

A student who is enrolled in good standing in a graduate degree program at another institution and who wishes to take courses for transfer to that institution may be admitted after submitting a completed online Graduate Application for Admission, the application fee, and a Transient Student Certification form 10 days prior to registration. Only one semester, or a maximum of 12 hours, of course work can be taken in transient status. Necessary forms may be obtained from the website graduateadmissions.utk.edu.

Postdoctoral Admission

Persons who hold an earned doctoral degree and desire to take graduate courses may be admitted in the postdoctoral status. A completed online Graduate Application for Admission, the application fee, and confirmation of the doctorate are required for admission.

Admission in the postdoctoral status does not constitute admission to a degree program. The student who seeks to enter a degree program must meet all admission requirements and be recommended by the program.

Admission of International Students

For admission to a graduate program, an international student must have an equivalent 4-year bachelor's degree with at least a B average on all previous course work and a B+ on all previous graduate work. On various grading scales, this corresponds to

- 14 on a 20-point scale.
- 80.0 from Taiwanese institutions.
- 1st Class or Division from Indian institutions.
- Upper 2nd Class Honors on various British systems.

If graduating from a U.S. institution, the minimum is the same as that for domestic students (see Admission Requirements). Other grading systems are evaluated, upon receipt of transcripts, in accordance with standard recommendations. Many departments require a higher average than the minimum.

International students may apply for admission any semester, but normally enter the fall semester. The deadlines for submission of applications to the Office of Graduate Admissions are:

Fall	1 February
Spring	15 June

The Office of Graduate Admissions must be notified of any change in entering date after admission has been granted.

International Exchange Graduate Students

The University of Tennessee, Knoxville seeks to develop and continue relationships with institutions of higher education around the world in an effort to globalize the experiences of students. The Center for International Education at UTK in collaboration with academic units establishes and maintains formal agreements between UTK and these institutions, outlining the specific conditions of each reciprocal graduate student exchange program. The Center for International Education and the Graduate School monitor jointly the International Agreements to ensure current program status and approval of graduate level student participation. As a host institution, UTK requires that all criteria for admission and enrollment for international students must be met.

An international exchange graduate student may register as a non-degree student for the period specified in the exchange agreement of up to one academic year (two full session semesters and one summer term) and must comply with all regulations (federal and university) with regard to course load. In addition, they must meet any other requirements affecting non-degree graduate students.

An international exchange graduate student must obtain the approval of the instructor and of the director of graduate studies in the academic discipline prior to enrolling in a course. The transferability of academic credit is determined by the student's home institution.

International exchange graduate students are required to submit official documents and meet the requirements of the Graduate School as listed in Admission of International Students. Incoming exchange graduate students will work with the Programs Abroad Office of the Center for International Education and the coordinators of the International Agreement at the home and host institution to submit the documentation as required by all parties in the exchange.

If an international exchange graduate student who was enrolled as a non-degree seeking student later applies for admission to the University as a degree-seeking graduate student, he or she must follow the normal procedures required for admission to a degree program, as described in Admission of International Students. The use of any graduate coursework completed as a non-degree exchange student toward degree requirements will be subject to approval of the student's faculty committee. All requirements related to courses that may be counted toward graduate degrees apply, including rules concerning courses counted toward another degree.

English Certification

Any person whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). A

minimum score of 550 on the paper test or 80 on the Internet-based test typically with a score of 20 on each of the sections of the test (reading, listening, writing, and speaking) is required for admission consideration. For the IELTS, a minimum score of 6.5 is required. Some programs require higher scores. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement.

All students whose native language is not English must take an English proficiency examination after arrival at the University of Tennessee, Knoxville. Refer to section on English Proficiency.

Transfer Credit

Formally the University does not transfer graduate credit obtained at other Universities. For students with significant prior graduate credit in courses equivalent to those offered in our department, modifications (i.e., reductions) in course requirements may be possible and requires approval of the Dean of the Graduate School. The graduate program director for the department can evaluate a student's prior graduate coursework and determine whether the department is willing to recommend a modification to the degree requirements to the graduate school. Students who believe they have sufficient prior graduate credit to warrant such consideration should be prepared to provide transcripts and syllabi as evidence of course content and performance. Coursework reductions are generally limited to one or two courses; coursework taken outside the US is typically not accepted as a basis for coursework reduction due to the extreme difficulty in establishing equivalence to courses here at UT.

Change of Programs

For current graduate students, when you filled out that application, you had to select whether you were entering the MS or PhD program. We encourage prepared students to work toward the PhD degree. The choice you made can easily be changed; it also affects what research classes you are allowed to register for, specifically Chem 500 and Chem 600. Chem 500 is strictly speaking, thesis (MS) research and Chem 600 is dissertation (PhD) research.

If you were admitted into the Master of Science program, you will be permitted to register for Chem 500 at the appropriate time, the actual start of your research in a particular research group. However, if your intention is actually to complete the PhD, you will have to file a "Request for Change of Graduate Program" prior to entering candidacy for the PhD. This should be done when you and your major professor decide that you should begin registering for Chem 600. Typically, enrollment in Chem 600 begins the semester after completing the candidacy exam (Note the continuous registration requirement for Chem 600.)

5. Financial Support

Preamble

Programs of graduate study are designed to transform the individual from student to knowledgeable practitioner or professional scholar. When a graduate assistantship is well

conceived and executed, it serves as an ideal instrument to facilitate the desired transformation. The primary goal of an assistantship, then, is to facilitate progress toward the graduate degree. While the student assistant makes progress toward an advanced degree, he or she also receives work experience in a profession under the supervision of a faculty mentor.

The graduate assistant is both student and employee. As a student, the graduate assistant is expected to perform well academically to retain the assistantship. He or she is to be counseled and evaluated regularly by a faculty mentor so as to develop professional skills. As an employee, the graduate assistant is expected to meet teaching, research, and/or administrative obligations. He or she is to work under the supervision of experienced faculty and receive in-service training. In sum, the graduate assistant receives financial support for graduate study by contributing to the teaching and/or research mission of the university. The totality of responsibility may be greater than that required of other students or staff members, but the opportunities for professional development also are greater for the graduate assistant. – *Tennessee Conference of Graduate Schools*

Definitions

An assistantship is a financial award to a graduate student for part-time work in teaching, administration or research while pursuing study toward an advanced degree. Appointments are normally on a one-fourth to one-half time basis, and the annual stipend is payable in either nine or twelve monthly installments. In addition to the stipend, Graduate Teaching Assistants, Graduate Teaching Associates, Graduate Assistants, and Graduate Research Assistants are entitled to a waiver of fees for the period of appointment in accordance with university policy. University fees include a maintenance fee (required of all students), tuition (additional for out-of-state students), a program and services fee, and a technology fee. The waiver of fees for assistantships applies to maintenance and tuition fees only; it does not include the program and services fee, the technology fee, the facilities fee, or the transportation fee. For Graduate Research Assistants the maintenance fee is paid by the granting agency and is in addition to the stipend paid. Maintenance fees and tuition waivers apply to appointments at a one-fourth time basis or higher.

Types of Assistantships

It is imperative that each department adheres to the University of Tennessee, Knoxville, *Faculty Handbook's* four categories of assistantships. All departmental guidelines should reflect the descriptions provided in the Handbook.

Graduate Teaching Assistant

Graduate teaching assistants work under the direct supervision of regular faculty members and may be assigned only to duties related directly to instruction. These include such activities as assisting in the preparation of lectures, leading discussion sections, conducting laboratory exercises, grading papers and keeping class records. Assistants may not be given primary teaching and/or evaluation responsibilities nor should they be given duties to support faculty research or those basically clerical in nature.

In consultation with the supervisor, the teaching assistant works to gain teaching skills and an increased understanding of the discipline.

Graduate Teaching Associate

Graduate Teaching Associates are advanced graduate students who have been given primary responsibility for teaching undergraduate courses, including the assignment of final grades. No other category of graduate assistant may be so charged. Associates may not be assigned primary responsibilities for teaching and student assessment in courses approved for graduate credit. Associates must have met the Southern Association of Colleges and Schools (SACS) 18-hour requirement.

Graduate Assistant

Graduate Assistants are appointed to perform various types of duties other than those related directly to teaching or research. Most commonly, these duties relate to supervisory or administrative functions of the university.

Graduate Research Assistant

Graduate Research Assistants perform duties in support of university research, which may or may not relate directly to the students' thesis/dissertation. A student appointed as a GRA works under the direct supervision of his/her major professor. Research assistantships may be financed through funds from gifts, grants, contracts, state appropriations designated for research, or the university's internally sponsored programs. Department heads are responsible for assuring that GRAs receive ample opportunities to make continuing progress toward their degrees.

Work Assignments and Related Factors

Most Chemistry graduate students are employed 50% time as either graduate teaching assistants, graduate research assistants, or a combination of the two. Chemistry graduate students are typically supported as either half time graduate teaching assistants (GTAs, with stipend supported through teaching duties), quarter time graduate teaching assistants/graduate research assistants (split GTA/GRAs, with 50% stipend supported through teaching duties, and the other 50% commonly supported by grant funds from the major professor), and graduate research assistants (GRAs, commonly with stipend fully supported by the grant of their major research professor). The assignments for each particular graduate student in a given semester are dictated by factors including the grant support of their major professor, the teaching needs of the department, as well as other considerations.

For a quarter time appointment, the graduate assistant's normal work time should not exceed 10 hours per week. For a half time appointment, the average number of hours should not exceed 20 hours per week. Appointments exceeding 50% must have prior approval of the Dean of the Graduate School, excluding summer term. The normal number of hours for conducting an

assignment should be mutually understood by the graduate assistant and immediate supervisor. For percentage efforts not covered by those appointments above, the normal work time per week will be prorated.

Tutoring

Graduate students are allowed to tutor students in our undergraduate courses at the Department-set rate provided the student is not in the tutor's class and there is no way the tutor can influence the student's grades. A list of Department tutors is kept in the General Chemistry Office, where graduate students should go to be added or removed from the list.

Occasionally Chemistry graduate students are offered positions as tutors in other programs on campus such as the Black Cultural Center or the Athletic Department. A few hours of such activity are acceptable but it should never interfere with Department responsibilities including research progress.

Note Well: International Students beware of accepting tutoring position elsewhere on campus. These are actual UT appointments and will increase your total employment to more than 50%. Such an occurrence will put students with F-1 visas "out-of-status" and subject to immediate deportation.

Outside Employment

Graduate students in Chemistry typically hold 50% time appointments as teaching or research assistants and they are expected to pursue coursework or research activity the remainder of their time. Outside employment, except for a few hours of tutoring, or other professional activity is prohibited.

Full Time Status

A half time graduate assistant in each of the four categories of assistantships normally should enroll for 6-11 semester hours of course work, and full time status is attained by registration for a minimum of 6 credit hours in both the Fall and spring semesters and 3 credit hours in Summer semester. A quarter time graduate assistant in each of the four categories of assistantships normally should take 9-13 semester hours. Exceptions to the above must have prior approval of the Head of the student's academic home unit. Certain benefits are available only for students registered for a minimum number of credit hours. Sometimes that is whatever constitutes full time status. However, some require a minimum of 9 hours, for example free use of the health clinic in fall and spring semesters. Sometimes these benefits are available if a student agrees to pay the various fees associated with 9 hour enrollment. Thus, a Chemistry graduate student may wish to register for 6 hours but pay additional fees to, for example, access the student health center.

Maximum Time Periods for Assistantships

The maximum number of years that a graduate student can be appointed to a 25% or more assistantship is three years as a master's student, five years as a doctoral student, or eight years in doctoral programs in which students enter with a baccalaureate degree only. Departments or programs may impose stricter limits. Requests for an extension beyond the maximum terms here specified must be made in writing by the academic unit to the Dean of the Graduate School. Established time limits for completion of graduate programs – six years for a master's program and eight years for a doctoral program – also apply to all graduate assistants.

Qualifications of Graduate Assistants

Graduate assistants must be currently enrolled in graduate study (as fully-admitted degree-seeking students, non-degree students, or transient graduate students). The Southern Association of Colleges and Schools (SACS) 18-hour requirement must also be met.

Competency in English

The University of Tennessee, Knoxville, requires all who teach to be competent in spoken English. The specific policy, as it relates to graduate students who teach, is as follows: Since a certain level of competency with English as a spoken language is necessary for effective communication and teaching, all Graduate Teaching Assistants and Graduate Teaching Associates whose first language is not English are required to demonstrate an appropriate level of comprehensibility for classroom teaching by taking the SPEAK Test administered through the Graduate School. The Test of Spoken English (TSE) may be taken in lieu of the SPEAK Test. The results of this test will be communicated to the appropriate department to be used in determining the nature and extent of instructional or other duties assigned the Graduate Teaching Assistants or Graduate Teaching Associates. Suggested modes of remediation will be given to the department and graduate student when appropriate.

New international students who have been offered an appointment as Graduate Teaching Assistant or Graduate Teaching Associate will take the SPEAK test after their arrival at the University of Tennessee, Knoxville, and the results of the test will be used to determine the nature of their assignment.

Validation of competence in communicating with students in English is required for all who are responsible for working with students. Deans, department heads, and directors are responsible for validating such competence, using the appropriate university form (APR FORM 1-89).

Rights/Responsibilities of Graduate Assistants

As specified in the *Personnel Policies and Procedures Manual* (Section 100 105-Pr3, p 2), "A student employee is one whose primary function is that of enrollment in an academic program." Thus, first priority of all graduate assistants must be satisfactory progress in their scholastic program. At the same time, acceptance of an assistantship is predicated on the belief that satisfactory progress can be concurrently achieved in work assignments and scholastic programs. Collaborative efforts between graduate assistants and their supervisors should be focused on the goal of satisfactory performance in both these areas.

In cases where graduate assistants feel that they have a legitimate complaint about any aspect of carrying out their assignments (work hours, duties assigned, pay, work conditions, etc.), they have a right to pursue all established channels to resolve the conflict. In the order that follows, the student should speak to his/her immediate supervisor, the appropriate department head, the appeals committees in the home unit or college, and the dean of the college/school involved. If the student feels that a resolution should be sought beyond the department/college level, the Dean of the Graduate School should be contacted. Established procedures outlined in the Graduate Council Appeals Procedure and/or *Hilltopics* will be followed.

Graduate assistants' benefits as employees of the University of Tennessee, Knoxville, in addition to fee waivers as explained elsewhere, include workers' compensation as defined in the *Personnel Policies and Procedures Manual* under employees' status. The specific wording reads, "Employees so designated [as student employees] receive no benefits other than statutorily required payments which include Workers' Compensation" (Section 100 105-Pr2-3).

Graduate student assistantship appointments (Graduate Assistants, Graduate Teaching Assistants, Graduate Teaching Associates and Graduate Research Assistants) are of two types: academic year and twelve month or other. Students on academic year appointments for the fall and spring terms receive 12 equal monthly payments for the nine months of service and a waiver of fees for three terms (including the summer). Students appointed to an academic year appointment beginning in the spring term have the option of receiving seven equal monthly payments for the January-July period or six equal payments for the February-July period. In both cases a fee waiver is provided for spring and summer terms. Graduate students on academic year appointments have no assistantship responsibilities in the summer term. Students appointed to 12 month or other appointments receive equal monthly payments for the months of the appointments and have assistantship responsibilities for the full period of the appointment. For these appointments a waiver of fees is provided only for those terms included within the appointments (i.e., a waiver of fees for the summer term requires an appointment which encompasses the summer term in its entirety.) In some situations, a graduate assistant may be appointed for a period shorter than a year (e.g., a semester).

Graduate assistants who are performing satisfactorily are normally reappointed up to the maximum time limit as stated below. In situations where the demands of the department do not call for a job to be continued, reappointment may not be made. In cases where a department has a rotational plan for assistantships, graduate assistants likewise may not be reappointed.

In all cases of appointment and reappointment, the supervisor is responsible for notifying the graduate assistant as early as possible. When an assistantship is not to be renewed, the graduate student should be notified in advance. In most cases, this notice must be given no later than one month prior to the end of the appointment. Specific reasons for not renewing the contract should be given (e.g., discontinuation of the program or grant, significant neglect of duty, unsatisfactory academic performance or progress toward a degree, non-compliance with university policies, etc.). In cases where an assistantship is for one year only, the student should be told this at the time of appointment. In some circumstances, graduate assistants may be given a conditional appointment such as an appointment in which funding of a grant is pending.

As students, graduate assistants' rights and responsibilities are defined in the *Faculty Handbook* section on Student Rights and Responsibilities and the Student Rights and Responsibilities section of *Hilltopics*. Additional rights and responsibilities of graduate students are found on the student's copy of the admission status form.

Fellowships

The Graduate School at the University of Tennessee offers a number of fellowship programs that can be found at the following website:

<http://gradschool.utk.edu/fellowships.shtml>

6. Degree Requirements, Registration and Advising

Requirements for Degrees

The requirements for the PhD and MS degrees in chemistry are summarized in the box above below, which is adapted from text that will be listed in the Graduate Catalog.

The remainder of this section of the Handbook discusses some aspects of these requirements in more detail. You can always consult the department's graduate program director if you have questions about these requirements.

Diagnostic Exams and Qualifying Courses

While advanced degrees largely involve developing specialized training in an area, students with an MS or PhD in Chemistry are also expected to have a broad general knowledge of the discipline. The diagnostic exams, sometimes referred to as entrance exams because they are administered when new graduate students arrive, and the qualifying courses that students take if they do not pass the diagnostic exams, serve the purpose of establishing that all students who receive an MS or PhD in Chemistry from the University of Tennessee possess broad general knowledge of chemistry. The diagnostic exams are discussed fully in Appendix 1. Each exam is graded as a pass (exempt), a marginal fail (some strength in the area is shown), or fail. Students are required to qualify in 3 of these 4 areas: Analytical, Inorganic, Organic and Physical Chemistry. A student qualifies in an area by either passing the diagnostic exam or by satisfactorily completing a designated course. The purpose of the exams is not to limit admission or progress but to inform the advisor and the student of minor to serious deficiencies in a student's preparation for graduate courses. If the deficiencies are minor (marginal fail on the exam), the recommended qualifying courses will include a graduate course in that area. Some additional effort may be required to complete the particular graduate course as the exam results indicate the student has some gaps in either comprehension or mechanics in material fundamental to that field. When the deficiency

Graduate Catalog

PhD:

- Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.
- Participation in seminar (CHEM 501) at the beginning of the period of graduate study until 6 hours of satisfactory credit has been obtained.
- Prescribed courses based on performance on diagnostic examinations.
- Completion of CHEM 503
- Preparation of a written candidacy research proposal (CRP) based on current and proposed research and oral defense of the CRP to give 2 credit hours in CHEM 603.
- Preparation and defense of an original research proposal (ORP) to give 1 credit hour in CHEM 604.
- 18 additional hours in courses at the 500 level or above including at least one course above 604 and one of the following sequences – 510-511-513; 530-531-532-533; 550-551-552; 570-571-572-573 or 590-594-595-596.
- Publication of a minimum of one article in a peer-reviewed journal describing research performed during graduate studies.
- A final oral examination.

MS:

- Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 500.
- Participation in seminar (CHEM 501) at the beginning of the period of graduate study until 3 hours of satisfactory credit has been obtained. (No more than 3 hours may be applied to the course requirements.)
- Prescribed courses based on performance on diagnostic examinations.
- Completion of CHEM 503
- Sufficient graduate coursework in chemistry (at the 400 level or above) and/or a related field to make an overall total of 30 hours, including one of the following sequences – 510-511-513; three of 530-531-532-533, 550-551-552, 570-572-573 or 590-594-595. At least 14 hours of this graduate course work must be at the 500 level or above.
- A final oral examination.

is more serious, especially if this occurs in more than one area, students will be recommended to remediate the deficiency with an undergraduate course before proceeding to graduate courses in the deficient area.

NOTE: Only certain courses are designated as qualifying courses for an area! These are:

Analytical:	210, 510, 511, 513
Inorganic:	330, 530, 531
Organic:	260, 360, 550, 551
Physical:	370, 570, 572, 573

The letter that a student receives notifying them of their diagnostic exam results will clearly indicate the courses recommended for them to qualify in an area based on their exam results.

Students are encouraged to make up deficiencies discovered by these exams as soon as possible, preferably in the first year of graduate study. When this is not possible, as doing so will adversely impact progression in required courses in the student's major area, the remedial process should be completed as soon as possible in the second year.

Initial Advising

Following completion of the diagnostic exams, students meet with temporary advisors to discuss initial course selection. Typically a course in the student's intended major along with one other course will be recommended. A strong performance on the entrance exams (passing at least 3 exams) can allow a focused student to concentrate immediately on their area of specialization by taking two courses in that area in the first semester. It is important to choose the initial courses wisely to prevent an overload and to insure that courses in the intended major, deficiencies and electives can be completed as quickly as possible to allow the student to begin her or his research and to allow PhD students to begin to prepare for admission to candidacy.

Coursework and Selection

Each Chemistry sub-discipline offers three or four courses that explore the fundamental concepts of the field. All PhD students must complete one of these sequences. In addition, it is recommended that the minimum course requirements for the PhD (18 hrs) be completed with courses that complement the main sequence. A minimum of six 3-credit hour courses must be completed with a GPA of 3.0 or greater for the PhD degree. MS students are required to complete 3 courses of one of the sequences as part of their 30 total required hours. Students involved in interdisciplinary research projects or with significant deficiencies as revealed by the diagnostic exams may need to take more than the minimum number of courses. Course selection following the initial semester must be done in consultation with a student's major professor, who can give advice on courses taught in other departments that might bear heavily on a particular research area.

One point about coursework is worth clarifying. For both the MS degree and the PhD degree, completion of prescribed courses based on performance on the diagnostic exams (discussed previously) is required. In an area in which a student receives a marginal failing grade on the

diagnostic exam, and is therefore eligible to qualify by completing a graduate-level course, the graduate-level course can be used to meet the coursework requirements for the degree.

Note: Some University rules for graduate coursework probably differ from what you are used to from your undergraduate experience. Here are a few important points:

1. You must maintain at least a 3.0 GPA on all graduate coursework to be in good academic standing with the graduate school. You cannot receive an advanced degree (MS or PhD) if you have less than a 3.0 GPA!
2. No graduate course with less than a "C" grade (a "D" or "F") can be used to satisfy a degree requirement.
3. A graduate course cannot be repeated (in effect this means you get one attempt and one attempt only at taking a course for a grade).
4. A 400-level course may be taken for either graduate or undergraduate credit. 400-level courses taken for graduate credit can affect your graduate GPA (for good or bad). 400-level courses taken for graduate credit may be used to help meet course requirements for the MS degree only. 400-level courses designated as qualifying courses may be taken for either graduate credit or undergraduate credit; satisfactory completion either way meets the qualifying requirement in that area. The normal default status for enrollment in a 400-level course by a graduate student is for graduate credit. The deadline for changing this is the "change credit/grading" deadline given in the timetable/financial deadline calendar posted on the Registrar's web site (<http://registrar.utk.edu/>).

Courseloads

Most first year students begin by taking two 3 hour courses and Chem 501 (seminar) for a total of 7 credit hours in each semester of their first year. Both courses taken in the semester are most often graduate courses (500 level or above), but some students may end up taking a 300 or 400 level qualifying course instead based on their performance on the diagnostic exams. Students on a half time assistantship taking 6 or more hours per semester (fall and spring) are considered to be full time. At this pace, coursework requirements for the PhD can normally be completed within 3 or 4 semesters. Some students who are especially well prepared or have lighter assistantship responsibilities may choose to take 3 courses per semester. Students who do this successfully will of course complete their coursework requirements more rapidly and be able to become completely engaged in research earlier in their graduate career.

Advanced degrees in Chemistry are principally research degrees, that is, your principal challenge is to become a good scientist thoroughly knowledgeable in the topics that bear on the completion of your dissertation project. Given the enormous body of scientific knowledge it is impossible to provide sufficient courses to satisfy every need of active researchers. The required coursework instead provides the fundamentals of each of the traditional Chemistry sub-disciplines so that beginning researchers are equipped with knowledge of the principles required to assimilate facts and results on their own. In other words, graduate courses provide an intellectual workbench and a key to the library in which that foundation is most fruitfully employed.

The development of new tools and the improvement of old methods and approaches are so

dramatic that courses cannot possibly replace professional vigilance of current developments. Active researchers must maintain a connection to the primary literature in their areas of interest including related disciplines. Nevertheless, some expertise is required to facilitate this activity; hence, basic courses are required.

Selection of a Major Professor

Selection of a research advisor, or major professor, is undertaken during the first semester of graduate study. Approximately 2 weeks after the beginning the fall semester, a meeting will be held in which all incoming students will be provided with information and links pertaining to the advisor selection process and the research interests of faculty in UTK Chemistry.

Selection of a research advisor is one of the most important steps in making rapid progress

Graduate Catalog

Advisor/Major Professor

Every graduate student must have an advisor from the major department. This professor advises the student about courses, supervises the student's research, and facilitates communication within the major department, to other departments and with the Dean of the Graduate School. The advisor must approve the student's program each semester.

through the graduate degree (MS or PhD) program. Any number of questions can be posed while making this selection, such as: Does the research excite you? Is the research group one in which you feel comfortable? Are the members of the group hard working and dedicated?

Following submission of advisor selection paperwork on a timeline that will be communicated to incoming students, the Department head will contact the individual faculty members and determine if their selection as major professor is acceptable in each case. Assuming the response is affirmative, which it typically is, the process is complete and the student will be so notified by either the major professor or the Department head.

Each student is asked to provide first and second choices for major professor. Normally, students get their first choice. Occasionally, a particular research group attracts too many new students to accommodate them all due to lack of space, funds, etc. When this occurs, a student may be asked to consider her or his second choice. There is no stigma associated with this. In fact, it is often the case that the specification of first and second choice is arbitrary, especially when a student has broad or multidisciplinary interests.

Once the major professor selection is complete, students should move their offices (if necessary) to the research area of the major professor and *notify the main office and the general chemistry office of any change in room number or phone number*. This should be accomplished by the start of Spring semester.

Initiation of Research

Beginning no later than the start of Spring semester (or the second semester in residence) students should begin to work on their research project as directed by the research advisor. The nature and extent of research activity will vary widely depending on the nature of the project, but it is essential that the effort begins. Since most first year graduate students will be taking two classes and teaching as a full GTA, it is important to develop time-management skills so multiple goals can be pursued successfully.

All graduate students should begin registering for research during their second semester in residence. Full time GTAs should register for 1 credit hour or more of Chemistry 500 after their first semester. Those supported with research funds should register for more than the minimum. Once a student registers for Chem 600 she or he must register for 600 every semester until graduation! Any lapse in registration for Chem 600 requires permission for a leave of absence from the graduate studies office and approval of the Dean of the Graduate School.

It is the recommendation of the department that PhD students make the transition from registering for thesis research (Chem 500) to dissertation research (Chem 600) after they are admitted to PhD candidacy.

First Year Evaluation

Each year following the end of Spring semester, the Chemistry faculty meet to evaluate the performance of first year graduate students. Students who enter the department in January are evaluated after three semesters in residence. This is discussed more completely in the material on diagnostic exams found in Appendix 1.

In the first year evaluation, students are reviewed based on academic performance, completion of diagnostic exams and qualifying courses, and preliminary progress on research. The expectation of our graduate students is that they will have:

- maintained at least a 3.0 grade point average
- made significant progress by completing 12 “coursework” credit hours that count towards the requirements for a graduate chemistry degree
- joined a research laboratory and made initial progress on a research project

After considering each student based on these criteria, students are placed in one of 4 categories with the following definitions.

Category 1: Your performance to date has been satisfactory; you have completed the entrance exam requirements and maintained good academic standing. Therefore, you are on track at this point for continuation in the PhD program.

Category 2: Your performance to date is satisfactory with noted exceptions: typically these include failing to complete the entrance exam requirements in the first year or minor variance from a 3.0 overall GPA. Students who are in category 2 may move to category 1 by rectifying the noted exception within a designated timeframe. Students in category 2 will normally be reevaluated at

the end of the second year.

Category 3: Your performance to date indicates you should go directly to the MS Degree.

Category 4: Your performance to date has been unsatisfactory. You are dismissed from the program. Please note that dismissal may occur regardless of a student's status with the Graduate School.

The results of first year evaluation may be appealed through the general appeals process for departmental requirements indicated in this handbook (see page 31).

Summer Registration

Graduate school policy requires that all students who are using facilities and faculty time are required to be registered, even in the summer semester. If you were on a quarter or half time teaching assistantship in the spring semester, you continue to have a tuition waiver for the

Note Well!

An important aspect of summer registration involves the health insurance provided to graduate students employed by UT. *According to the Graduate Assistant Handbook, registration for a minimum of 3 credit hours is required for continuation of health insurance coverage in the summer!*

summer; the only registration costs are the additional fees not covered by the tuition waiver. All graduate students in chemistry are expected to be actively working on research during the summer and should register for 3 hours of either Chem 500 (MS students and PhD students who have not yet been admitted to candidacy) or 600 (students who have been admitted to PhD candidacy). Registration for 3 hours entitles one to continued health coverage through the summer and use of the university health center as the primary care provider.

Progression to PhD Candidacy

A student in the Chemistry Department becomes a candidate for the PhD in Chemistry after she or he submits a written proposal describing her or his PhD research project, presents the proposal orally to her or his PhD Candidacy Committee (PCC), and answers questions about the proposal to the satisfaction of the PCC. The presentation of the written proposal and its defense before the PCC constitute the department's candidacy examination. The candidacy examination evaluates the student's preparation to undertake research, the student's progress to date, and the student's general background knowledge in appropriate fields.

The deadline dates listed in the subsections below are for students who enter the Chemistry graduate program in the Fall semester. Consult subsection C if you entered the graduate program in another semester, or if you change research groups during your first year of study.

Selection and Composition of the Graduate Committee

In consultation with her or his research advisor(s), a student should make a list of potential PCC members early in the Fall semester of her or his second year of graduate school. Ordinarily a student's PCC will become her or his Ph.D. committee once a student becomes a Ph.D. candidate, and so the composition of the PCC must generally satisfy the rules for Ph.D. committees that have been established by the University's Graduate School as briefly discussed below.

The committee will consist of four faculty members, one of whom will be the research advisor. The additional faculty members from the Chemistry department must include one professor from the student's division and one member from another division. A committee member from outside the department must also be selected. The PCC must consist of faculty members at the rank of assistant professor or above. Three of these faculty members, including the Chair, must have been approved by the University's Graduate Council to direct doctoral research. Ordinarily the Chair of the PCC is a student's research advisor.

All members of the committee must be chosen so that their area(s) of expertise have some

Graduate Catalog

PhD:

- Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.

MS:

- Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 500.

relevance to the student's proposed course of study to allow adequate evaluation during the candidacy exam. After a suitable list of members is constructed, the research advisor(s) will determine the final composition of the PCC. At this point, the student or their research advisor should approach potential PCC members and ask if these individuals are willing to serve on the student's PCC. Once the student and her or his research advisor have drawn up a list of potential PCC members, the research advisor will discuss the composition of the student's PCC with the faculty in the departmental division in which the student intends to study. After the PCC composition has been endorsed by their division, the student will submit to the departmental office a Doctoral Committee Appointment form with the signatures of all PCC members. This form must be submitted by the last Friday of December before the holiday break so that final approval of the PCC composition can be obtained from the Associate Department Head before examinations begin.

Candidacy Research Proposal Exam (CHEM 603, November – April of Second Year)

The non-coursework related portion of the candidacy requirement will be met by writing and orally defending a proposal based on the research that the student is performing. The proposal and examination should also cover general knowledge, i.e. this exercise will have both a focused research and a breadth component. This exam will be conducted in the student's second year of study. The research proposal will be read and graded by a committee that will also administer the candidacy exam.

A. Format of the Candidacy Research Proposal (CRP)

A student's candidacy proposal (CRP) is a written proposal based on the student's current and proposed Ph.D. research. The CRP should typically be 10 to 15 pages long and should follow the format of a major funding agency in the discipline of study chosen by the student. The CRP should include sufficient background information to situate the student's research program in a broader context, a summary of work accomplished to date, and a prospectus of work to be completed for the Ph.D. degree. This written document must be submitted to the PCC by the last Friday of December before the holiday break. UTK Chemistry runs documents for doctoral requirements through plagiarism software. Thus, when submitting documents to the PCC, students should include a copy to the Graduate Programs Assistant (currently Jennifer Fleming, jflemi18@utk.edu). Students may choose to supplement their proposal with a 1-2 page addendum (not a proposal revision) outlining research progress since the submission of the original proposal due at least two weeks before their oral examination.

B. Format of Oral Examination

A student will make an oral presentation of her or his CRP to the PCC in the spring semester of her or his second year of graduate study. The PCC will then ask the student questions about her or his CRP and the additional reading material assigned to the student by the PCC. The CRP defense is intended to evaluate the student's abilities to (1) understand relevant literature, (2) place her or his work in a broader context, and (3) demonstrate a base of general knowledge in appropriate fields. The CRP defense will typically last no more than 2 hours, with about 30 minutes devoted to presentation of the CRP and 1 to 1.5 hours devoted to questions and discussion. In the semester that the CRP oral exam is given, students will need to register for CHEM 603 to receive credit, which can be done by contacting the main office.

The oral portion of the candidacy examination must be administered no later than April 1st.

C. Alternate Time Lines for Examination

There are two situations in which the examination time line will need adjustment. Students who enter the Ph.D. program in Spring, and are off sequence, will be grouped with the class entering in the following Fall. In other words, these students will submit the proposal in their fourth semester in residence. Students who change groups in the first year of study before completing the candidacy exam will be given a three month extension on all deadlines. Students who change groups at a later date will be evaluated by the Graduate Student Advisory Committee on a case-by-case basis.

D. Possible Outcomes

1. Three outcomes are possible for the initial CRP defense

- (a) Pass: A unanimous vote of “pass” from the PCC is required for the student to pass the CRP on the initial defense.
- (b) Fail: If a student receives a unanimous vote of “fail” from the PCC, then the student will be directed to the M.S. program.
- (c) Requires Further Development. On the initial defense only, a grade of “Requires Further Development” may be assigned to allow for remediation of any deficiencies. This outcome can be assigned at the discretion of the committee or due to a non-unanimous vote concerning the outcome of the first exam. Remediation resulting from this outcome is also at the discretion of the committee, and may include revision of the CRP written document, one additional attempt at oral defense of the CRP, or both a revision of the CRP written document and one additional CRP oral defense. The PCC may also provide the student with a list of journal articles and other materials to read and master, and/or a list of topics that the student should review and master.

2. If a second attempt at the CRP is allowed through the “Requires Further Development” mechanism of section D1, then the potential outcomes for the follow-up exam are listed below. Only one second attempt at the CRP is allowed.

- (a) Pass: A minimum of 3 votes of “pass” from the PCC, as well as concurrence from the committee chair, is needed to pass a second attempt at the CRP.
- (b) Fail: If the student does not receive the minimum of 3 “pass” votes from the PCC with concurrence from the chair on the second CRP attempt, then the student will be directed to the M.S. program.

The final decision on each student’s defense must be made, and any remediation must be completed, no later than July 1 of their second year to determine if they will gain entrance to the Ph.D. program.

E. Receiving Credit for the Examination - Chemistry 603 (Candidacy Proposal, 2 hours)
Students enroll in the two hour course Chem 603 during the semester, normally the Spring, in which they conduct the oral defense of their candidacy proposal to receive credit for this exercise. Successful completion of Chemistry 603 fulfills the requirements for Ph.D. candidacy.

Third Year Seminar

Ph.D. students will present an open seminar of their research project and up-to-date progress during their third year in the program. These seminars will be organized as part of divisional graduate student seminar series within the Department of Chemistry. Divisional seminars will be organized by the head of each division (analytical, inorganic, organic, physical, polymer), and 3rd year students will present within the division they have selected for their graduate curriculum. Division heads should seek to organize these in consultation with all research advisors whose students will be giving seminars at a time that is accessible to a wide audience, and each 3rd year student in the division will be assigned a date and time for their presentation by the division representative. While these series will be organized by the divisions, they will be open to the

public and should be advertised at UTK. Each student's PCC must attend the presentation. If PCC member(s) must miss the seminar, the student will set up a meeting to make the presentation to those who could not attend.

Original Research Proposal Exam (CHEM 604)

An original research proposal (ORP) will be generated and defended. Passing the ORP examination is a graduation requirement that must be completed by the end of the student's seventh semester in the program (typically the Fall of the 4th year). During the semester in which they undertake the ORP, students will be required to register for a 1 credit hour course, Chemistry 604, which can be done by sending an e-mail to the Associate Head for Graduate Programs (currently Shawn Campagna, Campagna@utk.edu) and Graduate Programs Assistant (currently Jennifer Fleming, jflemi18@utk.edu). Students will work independently to write and defend an ORP that is sufficiently different from the student's dissertation research to demonstrate originality, as judged by the committee. The ORP committee should consist of the same members as for the candidacy exam. To pass the ORP exam, a unanimous vote of "pass" from the PCC is required. In addition, to receive credit for 604, students must submit a current *curriculum vitae* to the PCC, and must have given a public presentation of their dissertation research at a poster or oral session at either a meeting or within the department at some point in their graduate career. Other than these stipulations, the examination format for the ORP is analogous to that of the CRP, except that the topic is not the dissertation research.

CRP and ORP Scores

The PCC will score the CRP and ORP exams of all students. Students will be evaluated based on criteria including but not limited to their understanding of fundamental chemical principles, the quality of their written documents and oral presentations, progress on their research project, and the originality of their research project. Students will be provided a copy of the up-to-date scoring system that the PCC will use to score their exam. This process is used to assess the strengths and weaknesses of each student and the graduate student population as a whole. These scores may be considered during the student's yearly evaluation of graduate student performance.

Annual Evaluation of Graduate Students

The College of Arts and Sciences at the University of Tennessee requires that all graduate students receive an annual written evaluation. In the first year of graduate studies (prior to PCC formation), this letter will be prepared by the Associate Head and will reflect discussion about that student in the first year evaluation process. Subsequently, letters will be prepared by each student's major professor. Advisors should solicit the opinions of PCC members when evaluating students. Each letter should discuss the results from degree requirements from that year (Year 2: CRP exam, Year 3: seminar, Year 4: ORP exam). Otherwise, students will be evaluated by criteria including but not limited to their academic status, research results, and overall progress towards degree. The evaluation will ultimately indicate whether the student is or is not meeting expectations.

This written evaluation should be discussed in a face-to-face meeting between graduate students and their advisor (including the 1st year letter drafted by the Associate Head). The letter should conclude with signature lines for the evaluator (Associate Head or advisor) and for the student, indicating the date when this meeting occurred. The student's signature does not indicate agreement with each point of feedback. Signed annual review letters will be due to the Associate Head with a copy to the Director of Graduate Studies on June 1st of each year, and will be kept on file in the department.

Performance Below Expectations

If a graduate student is evaluated and deemed to not meet expectations, the major professor may choose to dismiss that student from her or his research group. Additionally, the major professor may elect to have that student be reviewed by the graduate advisory committee to determine if the student will be dismissed from the Chemistry Graduate Program and recommended to be dismissed from the UTK Graduate School. In doing so, the student in question will be allowed to prepare a written response within two weeks of receiving the evaluation letter that triggered this process. The graduate advisory committee will then consider these documents and dismissal will be decided based on a majority vote of the committee. This process can be triggered as a result of the annual evaluation or as soon as a problem comes to the attention of the major professor. Students may fail to meet expectations for a variety of reasons including but not limited to failure to make sufficient progress in their research, unsafe conduct in the laboratory, and violation of discipline-specific codes of conduct.

Publication Requirement

The publication of research results in the literature is an important milestone for developing scientists and a critical component for the success of graduate students in their future careers. For this reason, students are encouraged to maximize the publication of high quality research during their graduate careers. To emphasize the importance of these efforts, the department requires the publication of a minimum of one article in a peer-reviewed journal describing research performed during graduate studies prior to graduation with a Ph.D. in Chemistry. A copy of the qualifying publication must be presented to the doctoral committee along with the final dissertation in order to receive final signatures from faculty members indicating completion of the dissertation requirement. If an accepted publication is not yet in print, a copy of the submitted manuscript along with proof of acceptance from journal editorial staff will fulfill this requirement.

Thesis and Dissertation

MS students prepare a thesis; PhD students prepare a dissertation. The Graduate School has strict deadlines for graduation procedures including application to graduate, graduation paperwork and thesis/dissertation review that are posted on their website each semester. Final drafts of dissertations/these are due to the PCC at least two weeks in advance of the defense date. UTK Chemistry runs documents for doctoral requirements through plagiarism software. Thus, when submitting documents to the PCC, students should include a copy to the Graduate Programs Assistant (currently Jennifer Fleming, jflemi18@utk.edu). Excerpts of the graduate catalog descriptions regarding master's thesis and PhD dissertation are included below. The following discussion is directed to the PhD.

Graduate Catalog – Master’s Thesis

Thesis Registration

A student must be registered for course 500 each semester during work on the thesis, including a minimum of three hours the semester in which the thesis is accepted by Graduate Student Services. Six hours of 500 are required for the thesis option. After receiving the master’s degree, a student is no longer permitted to register for Thesis 500.

Thesis

The thesis represents the culmination of an original research project completed by the student. It must be prepared according to the most recent *Guide to the Preparation of Theses and Dissertations*, available at <http://web.utk.edu/~thesis>. Paper or electronic submission will be approved by the student’s committee prior to final preparation of the thesis. Two paper copies or an electronic copy of the thesis must be accompanied by two approval sheets, signed by the members of the master’s committee. The approval sheets reflect the final format for submission. The approval sheets certify that the committee members have examined the final copy of the thesis and have found that its form and content are satisfactory.

Final Examination for Thesis

A candidate presenting a thesis must pass a final comprehensive oral examination on all work offered for the degree. The final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination. This examination must be held at least two weeks before the final date for acceptance and approval of thesis by the Office of Graduate Student Services on behalf of the Graduate Council. The major professor must submit the results of the defense by the thesis deadline. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final.

Following the completion of Chem 604, assuming all other required class work has been completed, the PhD candidate has only to focus on completion of the dissertation project, and writing and defending of the dissertation. Under normal circumstances this should be completed in about an additional 1.5-2 years. Note that when Graduate Teaching Assistantships are initially offered they are guaranteed for the “normal duration” of PhD study, which is indicated as 5 years or less. Thus, extension of the GTA appointment for a longer period requires justification on a semester-by-semester basis.

A major stumbling block for many students is the actual preparation of the dissertation. Generally, it is not advisable to wait until the research is complete to begin thinking about the content and format of the document. Production is much swifter if planning begins well in advance and electronic records of experimental procedures, data summaries, spectra, etc. are accumulated as they are produced. All dissertations require a summary of prior investigations recorded in the primary literature and this can also be accumulated and summarized well in advance of the project completion.

The final format (and, of course, scientific content) of the dissertation becomes clearer as the project approaches completion. By this stage, however, much of the dissertation content has been accumulated and large portions of the final document can be ready for inclusion as “cut and

paste” material. Conscientious record keeping, including experiment summaries, etc. makes production of the final document a less awesome task. (Note that the Graduate School has a set of guidelines for the final form of the MS thesis and PhD dissertation. Before a student begins to write her or his thesis or dissertation, she or he should contact the Graduate School’s thesis and dissertation consultant to learn about these guidelines.)

Final Oral Examination and Defense

The oral examination is conducted by the student’s full dissertation committee. Generally it involves a public presentation of the project including a brief historical perspective, a clear statement of the problem or objective, a description of the approach to the solution or completion, and a summary of the principal experimental results and conclusions. This is followed by an open question period.

Following the public presentation, the examination is closed and the candidate is questioned by the committee. When the committee feels they are suitably informed, they confer privately and reach a final decision concerning the acceptability of the dissertation. This is quickly transmitted to the candidate along with any suggestions they have for improving the dissertation. In the case of a negative decision, they will inform the candidate of any options. The committee, while convened, will complete and all sign the “Report of Final Examination/Defense of Thesis or Dissertation”.

Following a successful defense, the dissertation is adjusted according to any final instructions from the committee and formatted to bring it into compliance with Graduate School requirements. When the dissertation is complete to the wishes of the committee they each sign the acceptance page which is part of the dissertation. (This can occur at the final examination if they are comfortable that typos and other cosmetic changes can be made acceptably before final transmission to the Graduate School.) Transmission of the final copy to the Graduate School constitutes the last step prior to official degree conferral.

The steps to graduation are described in detail at the Graduate School website:

<http://gradschool.utk.edu/graduation/steps-to-graduation/>

7. Standards, Problems, and Appeals

Academic Standards

Graduate education requires continuous evaluation of the student. This includes not only periodic objective evaluation, such as the cumulative grade point average, performance on comprehensive examinations, and acceptance of the thesis or dissertation, but also judgments by the faculty of the student’s progress and potential. Continuation in a program is determined by consideration of all these elements by the faculty and the head of the academic unit.

The academic records of all graduate students are reviewed at the end of each semester, including the summer term. Graduate students must maintain a cumulative grade point average

(GPA) of at least 3.0 on all graduate courses taken for a letter grade of A-F. Grades of S/NC, P/NP, and I, which have no numerical equivalent, are excluded from this computation.

Departments and programs may have requirements for continuation or graduation in addition to the minimum requirements set forth in this catalog for all graduate programs. It is the student's responsibility to be familiar with the special requirements of the department or program.

GPA Maintenance

The Graduate School requires that all graduate students maintain a "coursework" GPA of 3.0 or above. It is the policy of the Graduate School that, upon completion of 9 hours of graduate coursework, a graduate student will be placed on academic probation when his/her GPA falls below 3.0. Continued graduate study will be permitted if each semester's GPA is 3.0 or greater. When the cumulative GPA reaches 3.0 the student will be removed from probationary status. No degree can be awarded unless the cumulative GPA is 3.0 or greater. While the prior information pertains to the policy of the Graduate School for academic dismissal and probation, the Department of Chemistry is permitted to set higher standards. Specifically, students may be dismissed without a prior period of academic probation after the first two semesters if their GPA falls below a 3.0. This review is discussed in more detail in the section on "First Year Evaluation".

Dismissal

If a student is on academic probation, the degree or non-degree status will be terminated by the Dean of the Graduate School if the student's semester GPA falls below 3.0 in a subsequent semester. When the particular circumstances are deemed to justify continuation, and upon recommendation of the appropriate academic unit and approval of the Dean of the Graduate School, a student on probation whose semester GPA is below 3.0 may be allowed to continue on a semester-by-semester basis.

Dismissal of a graduate student by a department or program is accomplished by written notice to the student, with a copy to the Graduate School. In those cases where the department's requirements for continuation are more stringent than university requirements for graduate programs, the Dean of the Graduate School will evaluate the student's record to determine whether the student is eligible to apply for a change of status and register in another area of study. Registration for courses in a department from which a student has been dismissed will not be permitted, except by written authorization from that department.

Research Data Storage

Data resulting from research performed at the University of Tennessee is the property of the university. Therefore, all data, including but not limited to laboratory notebooks, computer files, and databases must be safely stored at the university following the departure of students. Further details regarding the university's data policy can be found at the following link:

http://research.utk.edu/files/2013/05/policy_research-data1.pdf

Academic Honesty

Academic integrity is a responsibility of all members of the academic community. An honor statement is included on the application for admission and readmission. The applicant's signature acknowledges that adherence is confirmed. The honor statement declares:

An essential feature of the University of Tennessee, Knoxville, is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.

All suspected instances of academic dishonesty, including but not limited to research misconduct (such as falsification, misrepresentation or modification of research results), non-compliance with academic or research policies, and plagiarism (see below) should be reported to the Head of the Department immediately to consult regarding the appropriate offices at the university that should be informed.

Plagiarism

Students shall not plagiarize. Plagiarism is using the intellectual property or product of someone else without giving proper credit. The undocumented use of someone else's words or ideas in any medium of communication (unless such information is recognized as common knowledge) is a serious offense subject to disciplinary action that may include failure in a course and/or dismissal from the university. Some examples of plagiarism are

- Using without proper documentation (quotation marks and a citation) written or spoken words, phrases, or sentences from any source.
- Summarizing without proper documentation (usually a citation) ideas from another source (unless such information is recognized as common knowledge).
- Borrowing facts, statistics, graphs, pictorial representations, or phrases without acknowledging the source (unless such information is recognized as common knowledge).
- Submitting work, either in whole or in part, created by a professional service and used without attribution (e.g., paper, speech, bibliography, or photograph).

Extreme caution should be exercised by students involved in collaborative research to avoid questions of plagiarism. If in doubt, students should check with the major professor and the Dean of the Graduate School about the project. Plagiarism will be investigated when suspected and prosecuted if established.

Petitions

Exceptions or substitutional modifications to departmental requirements normally require prior approval by vote of the faculty. Proposals must be submitted in writing to the head, associate

head or director of graduate studies in the form of a petition. Matters that are sometimes considered are: substitution of an appropriate course for a required course for the degree, extension of departmental support beyond the designated maximum, and extensions of designated limits for completion of a requirement. Exceptions must be based on a demonstrated equivalence for the substitution proposed or, if an extension for completion of a requirement is requested, it should be demonstrated that failure to meet the requirement was the result of extraordinary circumstances beyond the control of the student (medical, etc). Students should consult with their major professor regarding preparation of their petition.

General Processes for Appeals

The general appeal process for graduate students described in this handbook follows the traditional three-level structure of the University (Department, College and Graduate School). An appeal should first be made at the departmental level by submitting a written petition detailing the reasoning for the appeal to the Chemistry Department's graduate advisory committee. Please note that the Graduate School requires that petitions be submitted to the department within 30 days of the incident that is the focus of the appeal. The graduate advisory committee will review the appeal and may consult with the petitioning student's research advisor and/or degree committee, after which the graduate advisory committee will provide a written recommendation to the full faculty. The full faculty will then vote on the appeal. Subsequently, written petitions may be considered at the College level by the Dean's office, and at the University level by the Graduate School.

Appendix 1

Information on Diagnostic Examinations at Entrance

For Graduate Students in Chemistry

Department of Chemistry
The University of Tennessee
Knoxville, Tennessee 37996-1600

All entering fully-admitted full-time graduate students are required to take four diagnostic examinations: analytical, inorganic, organic, and physical chemistry. Each examination will cover the generally-accepted undergraduate content of the area as usually given in a one-year course taught beyond the elementary chemistry level. The examinations will be given preceding the beginning of classes of the Fall Semester. The exact times will be announced during the previous summer.

Each entering student must demonstrate proficiency in three areas, either by passing the diagnostic examination or by satisfactory completion of a qualifying course as designated by the faculty diagnostic examination committee. The qualifying courses from which the committee will make their designations are: analytical (210, 510, 511, 513), inorganic (330, 530, 531), organic (250, 360, 450, 550, 551), physical (370, 570, 572, 573). All designated courses should be taken in the first year of graduate study. It is emphasized in the strongest possible terms that adequate review and preparation for these examinations will have an important bearing on the students' progress, since proficiency in one or more of these courses is a large step forward. The examination system is designed to accomplish the following:

- 1.) It allows us to certify that a student is competent in the subject matter normally offered at the undergraduate level in the fields of analytical, inorganic, organic, and physical chemistry, and
- 2.) It offers the able and well-motivated student who is deficient in preparation in one or more of the above fields the opportunity to remedy this deficiency without serious delay in his/her graduate study.

In general, these proficiency examinations have been prepared and evaluated by national groups with the results standardized against a significant number of students at the beginning graduate level at other universities. The exams often used are the Graduate Placement Examinations prepared by the American Chemical Society, Division of Chemical Education.

It is strongly recommended that entering students prepare for these examinations from almost any 'standard' undergraduate textbook in the respective areas.

The beginning graduate student should be aware of another evaluation process, which occurs at the end of the first year of graduate study. The staff collects for all the students information about diagnostic examination scores and grades on all courses taken during the first year and recommends classification of each student into one of the four categories as indicated below:

1.) Category 1 the student proceeds directly to the PhD. To be eligible for this category, a student must have made satisfactory scores on the diagnostic examinations or have performed adequately in qualifying courses. Also, at least six hours of other graduate course work in addition to seminar must have been complete with a grade point average of at least 3.0.

2.) Category 2 is for the student who has fallen just short of the performance needed for Category 1. The faculty will normally prescribe a program which, if completed successfully, will result in reassignment to Category 1. If the program is not successfully completed, the student will be reassigned to Category 3.

3.) In Category 3 the student is directed into the MS degree program. This category is normally assigned to students who have fallen below the performance levels indicated in categories 1 or 2 above, but who still show promise of reaching an overall grade point average of 3.0. A grade point average of 3.0 is required by the University prior to the awarding of any graduate degree (please see Academic Standards and GPA Maintenance sections). It should be noted that a 3.0 gpa is also required by the Graduate School for a student to switch from the PhD to the MS program (see rules for GPA maintenance and academic probation in this document). Thus, if a student placed in category 3 does not hold a 3.0 gpa, they may be moved into category 4 by a majority vote of the faculty at any time. Finally, students placed in category 3 who remediate their deficiencies may be reconsidered for the PhD program near or after completion of the MS degree requirements based on a majority faculty vote.

4.) Placement in Category 4 constitutes a faculty recommendation that a student terminate his/her graduate study in chemistry at this University.

It should be emphasized that in the above evaluation process, the record of each is examined by the entire faculty and individual decisions are made within the guidelines indicated above, but it is understood that the faculty will use its discretion and all information available in assigning a category to any particular student.

This system is of great value to the student and to the faculty in that it strongly encourages the well-prepared student but at the same time does not severely penalize the strongly motivated but somewhat less well-prepared beginning graduate student.

Appendix 2

Chemistry entry in the Graduate Catalog 2020-2021

DEPARTMENT OF CHEMISTRY

<http://www.chem.utk.edu>

Viktor N. Nemykin, Department Head

Shawn R. Campagna, Associate Department Head for Graduate Programs

David M. Jenkins, Associate Department Head for Undergraduate Programs

Michael D. Best, Director of Graduate Studies

Professors

Barnes, C.E., PhD – Stanford University

Best, M.D., (Paul and Wilma Ziegler Professor), PhD – University of Texas, Austin

Campagna, S.R., (Atlantic Richfield Professor) PhD – Princeton

Dadmun, M.D. (Paul and Wilma Ziegler Professor, Joint Faculty), PhD – University of Massachusetts, Amherst

Dai, S. (Joint Faculty), PhD – University of Tennessee, Knoxville

Hinde, R.J. (Vice Provost of Academic Affairs), PhD – University of Chicago

Jenkins, D.M., (Paul and Wilma Ziegler Professor) PhD – California Institute of Technology

Kilbey II, S.M., (Paul and Wilma Ziegler Professor), PhD – University of Minnesota

Larese, J.Z., PhD – Wesleyan University

Musfeldt, J.L. (Paul and Wilma Ziegler Professor), PhD – University of Florida, Gainesville

Nemykin, V.N., PhD – National Academy of Sciences of Ukraine

Schweitzer, G.K. (Alumni Distinguished Service Professor), PhD – University of Illinois, Urbana-Champaign

Sokolov, A.P. (Governor's Chair, Science Alliance Center for Excellence), PhD – Novosibirsk (Russia)

Xue, Z. (Paul and Wilma Ziegler Professor), PhD – University of California, Los Angeles

Zhao, B. (Paul and Wilma Ziegler Professor), PhD – University of Akron

Associate Professors

Calhoun, T.R., PhD – University of California, Berkeley

Long, B.K. (Gleb Mamantov Professor), PhD – University of Texas, Austin

Assistant Professors

Baccile, J.A., PhD – Cornell University

Bailey, C.B., PhD – University of Texas, Austin

Brantley, J.N., PhD – University of Texas, Austin

Darko, A.K., PhD – University of Florida, Gainesville

Do, T.D., PhD – University of California, Santa Barbara

Heberle, F.A., PhD – Cornell University

Roy, S., PhD – Yale University

Sharma, B., PhD – University of Pittsburgh

Vogiatzis, K. (T. Ffrancon Williams Professor), PhD – Karlsruhe Institute of Technology (Germany)

MAJOR

Chemistry

Analytical Chemistry concentration
Environmental Chemistry concentration
Inorganic Chemistry concentration
Organic Chemistry concentration
Physical Chemistry concentration
Polymer Chemistry concentration

DEGREES

MS

Chemistry

Analytical Chemistry concentration
Chemical physics concentration (with Physics Department)
Environmental Chemistry concentration
Inorganic Chemistry concentration
Organic Chemistry concentration
Physical Chemistry concentration
Polymer Chemistry concentration
Theoretical Chemistry Concentration

PhD

The faculty of the Department of Chemistry at the University of Tennessee, Knoxville, seek to prepare their students to join the international ranks of professional chemists in fundamental areas of chemistry as well as cross-disciplinary sciences in which chemical expertise plays a critical role in the development of new knowledge and technologies. Students planning to major in chemistry for the master's or doctoral degree will ordinarily have attained a satisfactory record in the traditional areas of chemistry. The department, however, recognizes that modern chemistry transcends traditional disciplinary divisions. Therefore, it encourages students with undergraduate majors in chemical engineering, the biological sciences, physics, mathematics, computer science, or other fields to apply for admission to our program.

Interdisciplinary Graduate Minor in Computational Science (IGMCS)

The Department of Chemistry participates in the interdisciplinary graduate minor in computational science (IGMCS) program. Any student pursuing a master's or PhD with a major in chemistry can receive a minor in computational science by completing the appropriate IGMCS requirements. For additional information, see the description of the [Interdisciplinary Graduate Minor in Computational Science](#) listed under Department of Electrical Engineering and Computer Science or visit the IGMCS website at <http://igmcs.utk.edu/>. The Department of Chemistry also contributes courses to the IGMCS program curriculum.

Interdisciplinary Certificate in Sustainability Science

The Department of Chemistry is one of several departments participating in the Sustainable Technology through Advanced Interdisciplinary Research (STAIR) Program. Any student pursuing a master's or PhD with a major in chemistry can receive a Certificate in Sustainability Science by completing the appropriate STAIR Program certificate requirements. For further information, see the description of the certificate requirements listed under the Chemical & Biomolecular Engineering catalog.

Chemistry Major, MS Requirements

The requirements for the MS with a major in chemistry consist of the satisfactory completion of the following requirements.

- Research and a thesis to give 6 to 12 credit hours of graduate credit in CHEM 500.
- Required participation in seminar (CHEM 501) at the beginning of the period of graduate study until 3 credit hours of satisfactory credit has been obtained.
- Prescribed courses based on performance on diagnostic examinations.
- Sufficient graduate course work in chemistry (at the 400-level or above) and/or a related field to make an overall total of 30 credit hours, including one of the following sequences – CHEM 510-CHEM 511-CHEM 513, three of CHEM 530-CHEM 531-CHEM 532-CHEM 533, CHEM 550-CHEM 551-CHEM 552, CHEM 570-CHEM 572-CHEM 573 or CHEM 590-CHEM 594-CHEM 595. At least 14 credit hours of this graduate course work must be at the 500-level or above.
- A final oral examination.

Chemistry Major, PhD Requirements

The requirements for the PhD in chemistry (except for the chemical physics concentration) consist of the satisfactory completion of the following requirements.

- Research and a dissertation to give at least 24 credit hours of graduate credit in CHEM 600. Registration must be continuous from the beginning of research.
- Required participation in seminar (CHEM 501) at the beginning of the period of graduate study until 6 credit hours of satisfactory credit has been obtained.
- Prescribed courses based on performance on diagnostic examinations.
- Preparation of a written candidacy proposal (CP) based on current and proposed research and oral defense of the CP to give 2 credit hours in CHEM 603.

- Preparation and defense of an original research proposal (ORP) to give 1 credit hour in CHEM 604.
- 18 additional credit hours in courses at the 500-level or above including at least one course above 604 and one of the following sequences: CHEM 510-CHEM 511-CHEM 513; CHEM 530-CHEM 531-CHEM 532-CHEM 533; CHEM 550-CHEM 551-CHEM 552; CHEM 570-CHEM 571-CHEM 572-CHEM 573; or CHEM 590-CHEM 594-CHEM 595, CHEM 596.
- A final oral examination.
- Graduation with a PhD in Chemistry requires the publication of a minimum of one article in a peer-reviewed journal describing research performed during graduate studies.

The PhD program with a concentration in chemical physics is conducted jointly with the Department of Physics. Requirements depend on the choice of the major department. Chemistry departmental requirements include passing the above degree requirements plus 6 additional hours in physics at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement listed above.

Chemistry Courses

430 In-depth Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of the elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry.

(DE) Prerequisite(s): 330.

479 Physical Chemistry Laboratory I (2) Experiments on topics discussed in 471 or 473.

Contact Hour Distribution: 1 lab.

(DE) Prerequisite(s) or (DE) Corequisite(s): 471 or 473.

500 Thesis (1-15)

Grading Restriction: P/NP only.

Repeatability: May be repeated.

501 Chemistry Seminar (1) Lectures and discussion on current research.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 14 hours.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

505 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

Registration Permission: Consent of department.

510 Analytical Spectrometry (3) Principles and practice of optical and mass spectrometric techniques in quantitative chemical analysis.

Recommended Background: 2 semesters of physical chemistry.

511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatographic, and electrophoretic phenomena.

Recommended Background: 2 semesters of physical chemistry.

512 Electroanalytical Chemistry (3) Fundamentals of electrode processes; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to study of chemical systems.

Recommended Background: 2 semesters of physical chemistry.

513 Mass Spectrometry and Surface Characterization (3) Principles, development, and practice of modern mass spectrometric and surface characterization tools, including discussion of ion chemistry. Emphasis is on instrumentation.

Recommended Background: Undergraduate course work in instrumental analysis and physical chemistry.

530 Chemical Bonding (3) Wave mechanical atom, group theory, quantum approach to molecular orbital theory, covalent, ionic, and metallic bonding, ligand field theories, solid state.

Recommended Background: 1 semester of inorganic chemistry.

531 Characteristics of Inorganic Compounds (3) Descriptive chemistry of elements; structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, bioinorganic compounds.

Recommended Background: 1 semester of inorganic chemistry.

532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mossbauer, mass, and photoelectron spectroscopies for characterization of inorganic compounds.

Recommended Background: 1 semester of inorganic chemistry.

533 Chemistry of the Transition Metals (3) Theoretical and experimental foundations of modern coordination, organometallic, and bio-inorganic chemistry of transition metals; transition metal mediated catalysis, materials chemistry, isolobal theory, kinetics and mechanism of reactions of transition metals, and applications in organic synthesis.

Recommended Background: 1 semester of inorganic chemistry.

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; substituent effects on acidity and reactivity; introduction to reaction mechanisms.

Recommended Background: 2 semesters of organic chemistry.

551 Organic Reactions (3) Organic transformations of use in synthesis; carbonyl chemistry and carbon-carbon bond formation; stereochemistry and regiochemistry of synthetic processes.

552 Applications of Organic Reactions (3) Applications of organic reactions to directed synthesis targets including bio-organic substrates, natural products, medicinal agents, or other molecules of practical or theoretical interest.

(DE) Prerequisite(s): 551.

553 Spectroscopic Characterization of Organic Compounds (3) Organic structure elucidation using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry.

Recommended Background: 2 semesters of organic chemistry.

570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbital theory, molecular structure, and spectroscopy; introduction to group theory.

Recommended Background: 2 semesters of physical chemistry.

571 Advanced Quantum Chemistry and Spectroscopy (3)

(DE) Prerequisite(s): 570 or consent of instructor.

572 Thermodynamics and Statistical Mechanics (3) Macroscopic and microscopic description of equilibrium systems. Basic principles of thermodynamics and statistical mechanics, and application to selected chemical systems.

Recommended Background: 2 semesters of physical chemistry.

573 Chemical Kinetics and Transport (3) Time-dependent phenomena in chemistry: chemical kinetics, chemical dynamics, transport theory.

Recommended Background: 2 semesters of physical chemistry.

580 Radio and Nuclear Chemistry (3) Nuclear properties, structure, and models; radioactivity, decay processes; radioemission interaction with matter; radioemission detection; radioactive tracers; industrial; research and medical applications; fission; fusion; carcinogenesis; environmental radioactivity; radiation protection.

Cross-listed: (Same as Nuclear Engineering 535.)

581 Radiation Measurements Laboratory (4)

Cross-listed: (See Nuclear Engineering 550.)

590 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemical principles.

Recommended Background: 2 semesters of organic chemistry and 2 semesters of physical chemistry.

594 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, sequence distribution, and kinetics of polymerizations. Formation of block, graft, and network polymers. Reactions on polymers.

(DE) Prerequisite(s): 590 or equivalent.

595 Physical Chemistry of Polymers (3) Conformation of macromolecules, solution and bulk properties, rubber elasticity, kinetics of polymerization, polymer thermodynamics.

(DE) Prerequisite(s): 590 or equivalent.

596 Advanced Techniques in Polymer Synthesis and Characterization (3) This course will consist of both lecture and laboratory experiments directed toward polymer synthesis and polymer characterization techniques.

(DE) Prerequisite(s): 594 and 595

600 Doctoral Research and Dissertation (3-15)

Grading Restriction: P/NP only.

Repeatability: May be repeated.

603 Candidacy Research Proposal (2) Preparation of a candidacy proposal (CRP) based on current and proposed research and oral defense of the CRP that demonstrates an in depth and broad perspective.

Grading Restriction: Satisfactory/No Credit grading only.

Registration Restriction(s): Minimum student level - graduate.

Registration Permission(s): Consent of department head.

604 Original Research Proposal (1) Preparation and oral defense of an original research proposal based on thorough survey of chemical literature.

Grading Restriction: Satisfactory/No Credit grading only.

Registration Restriction(s): Minimum student level - graduate.

Registration Permission(s): Consent of department head.

610 Selected Topics in Analytical Chemistry (3) Topics of current significance.

Repeatability: May be repeated. Maximum 12 hours.

(DE) Prerequisite(s): 510, 511, and 512 or consent of instructor.

630 Selected Topics in Inorganic Chemistry (3) Topics of current significance.

Repeatability: May be repeated. Maximum 12 hours.

(DE) Prerequisite(s): 530, 531, and 532 or consent of instructor.

650 Selected Topics in Organic Chemistry (3) Topics of current significance.

Repeatability: May be repeated. Maximum 12 hours.

(DE) Prerequisite(s): Any two of 550, 551, 552 or consent of instructor.

670 Selected Topics in Physical Chemistry (3) Topics of current significance.

Repeatability: May be repeated. Maximum 12 hours.

(DE) Prerequisite(s): 570, 572, and 573 or consent of instructor.

690 Selected Topics in Polymer Chemistry (3) Topics of current significance.

Repeatability: May be repeated. Maximum 12 hours.

Registration Permission: Consent of instructor.

Appendix 3

Forms Used by graduate Students

The following forms can be found at <http://gradschool.utk.edu/gradforms.shtml>

Graduate Student Forms

Graduation Forms

All the forms are in interactive PDF. Refer to the instructions at the bottom.

Master's Student Forms

- [Main forms page](#)
- [Admission to Candidacy Application*](#) PDF (79 KB) z
 - [Revision to Master's and Ed.S. Candidacy Application](#) PDF (56 KB)
- Graduation Application - found on MyUTK / "Student Records" / "Apply to Graduate"
- [Report of Final Exam/Defense of Thesis \(Pass/Fail\) Form*](#) PDF (34 KB)

Doctoral Student Forms

- [Main forms page](#)
- [Admission to Candidacy Application*](#) PDF (43 KB)
- [Doctoral Committee Appointment Form*](#) PDF (26 KB)
- Graduation Application - found on MyUTK / "Student Records" / "Apply to Graduate"
- Report of Final Exam/Defense of Dissertation (Pass/Fail) Form* - *Committee Chair receives form from Graduation Specialist*
- [Scheduling Defense of Dissertation Form*](#) PDF (21 KB)

Pertinent Graduate Student Web Pages:

- Best Practices in Teaching
<http://gradschool.utk.edu/orientation/teaching.shtml>
- Center for International Education
<http://web.utk.edu/~globe/index.php>
- Counseling Center
[Counselingcenter.utk.edu](http://counselingcenter.utk.edu)
- UTK counseling emergency hotline
865-539-2409
- Funding, Fellowships, Assistantships for Graduate Students
<http://gradschool.utk.edu/gradfund.shtml>
- Graduate School
<http://gradschool.utk.edu>
- Graduate Catalog
<http://catalog.utk.edu/>
- Graduate Student Appeals Procedure
<http://gradschool.utk.edu/GraduateCouncil/AcadPoli/appealprocedure.pdf>

- Graduate Student Senate
<http://web.utk.edu/~gss>
- Graduate and International Admissions
<http://graduateadmissions.utk.edu/>
- International House
<http://web.utk.edu/~ihouse>
- Judicial Affairs
<http://web.utk.edu/~osja/>
- Office of Equity and Diversity
<http://oed.utk.edu>
- Multicultural Student Life/Black Cultural Center
multicultural.utk.edu
- Environmental Health and Safety
<https://ehs.utk.edu/>
- Research Compliance/**RESEARCH** with Human Subjects
<http://research.utk.edu/compliance/>
- SPEAK Testing Program
gradschool.utk.edu/graduate-student-life/ita-testing-program
- Thesis/Dissertation Website
<http://web.utk.edu/~thesis/>
- Library Website for Graduate Students
<http://libguides.utk.edu/graduate>
- OIT
<http://oit.utk.edu/>

Forms and Additional Resources

(Provide Copies—available on Graduate School Website (<http://gradschool.utk.edu>))

- Graduate Student Deadline Dates
 - Admission to Candidacy Application – Master’s Degree
 - Doctoral Committee Appointment Form
 - Admission to Candidacy Application – Doctoral Degree
 - Scheduling Defense of Dissertation Form
- Graduate Student Travel Award Forms (specific to department, college, and university)
(<http://web.utk.edu/~gss>)