

HANDBOOK FOR GRADUATE STUDENTS
Department of Chemistry and Biochemistry, Texas Tech University

(Revised August 2019)

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All forms referenced in this Handbook can be downloaded from the department’s website:

Chem.ttu.edu under the “Students → Graduate →Current”

I. INTRODUCTION AND OVERVIEW

Welcome to the Graduate Program in the Department of Chemistry and Biochemistry at Texas Tech University! The purpose of this Handbook is to give you a description of the departmental requirements for earning an advanced degree in chemistry. General requirements for graduate degrees are given in the Catalog of the Graduate School for the current year; those requirements govern advanced degree study at all times. The requirements presented in this Handbook are intended to amplify and supplement those stated by the Graduate School, particularly as they pertain to the Department of Chemistry and Biochemistry. Keep in mind that *you are subject to the Handbook that was current at the time that you enrolled*. If you have questions about your graduate program that the graduate catalog and this Handbook do not answer, then you should consult with your Research Advisor, the departmental Graduate Advisor, or the Dean of the Graduate School. Good luck with your studies!

A. Some Introductory Information and Guidelines

The Graduate Advisor

The Graduate Advisor is a member of the Department of Chemistry and Biochemistry faculty who is in charge of overseeing the orientation of newly enrolled graduate students and the progress of each graduate student as they advance through their degree programs.

The Graduate Advisor:

- 1) Signs the Program for the Master's Degree, or the Program for the Doctoral Degree.
- 2) Notifies you of your progress in meeting the degree requirements.
- 3) Assists you in requesting to have graduate courses transferred for credit at Texas Tech.

While the Graduate Advisor will help you to decide what courses you should enroll in during your first year of graduate studies, the Research Advisor that you choose in your first year will begin to play a major role in such decisions as you progress in your studies. The Graduate Advisor can act as an intermediary between you and the departmental faculty and as an intermediary between you and the Graduate School, in cases where you need such an intermediary. It is important to emphasize that your Research Advisor will become your principal advisor/mentor once you take the important step of joining a research group.

The Graduate Advising Assistant

The Graduate Advising Assistant maintains the database system that tracks your progress with the departmental requirements. This office is located in Room 37. It is very important that the Assistant receives the required forms in a timely manner so that your records can be kept current. Until the Assistant receives the forms, the Department does not recognize that you have completed the requirement and this may cause delays in your graduation plans.

Some Basic Requirements for Graduate Study in the Dept. of Chem. and Biochem

Every student who is pursuing an M.S. or Ph.D. degree in this department must, in order to attain or maintain their eligibility for their degree, do the following:

- 1) Be registered as outlined below.
- 2) Be *solely* enrolled in a TTU Department of Chemistry and Biochemistry graduate program (i.e., not dual enrolled in another degree or certification program, whether on or off the TTU campus).
- 3) Meet the deadlines indicated in this Handbook for the degree requirements.
- 4) Submit a degree plan ("Program for the Doctoral Degree" or "Program for the Master's Degree") by the deadlines listed.
- 5) Maintain a GPA of 3.0 or higher in graduate coursework.
- 6) Complete the required number of graduate credit hours (SCH) for the degree.
- 7) Complete the Final Examination requirement to the satisfaction of the student's Advisory Committee by the established deadline.

Research Ethics, Student Code of Conduct, and Responsible Conduct of Research (RCR)

Every student who is pursuing an M.S. or Ph.D. degree in this department is expected at all times to conduct themselves in a highly ethical and responsible manner. This expectation cuts across all aspects of graduate student life—coursework, exams, teaching duties, laboratory research, and scientific publication. Failure to do so in any such arena will be regarded as a serious offense that could lead to dismissal from the graduate program.

That said, we recognize that it may not always be clear to new graduate students—who come to TTU from diverse backgrounds—exactly which types of behaviors may be acceptable, and which are not. To help you in this regard, we provide you with many resources. Some of these take the form of explicit requirements that you must satisfy, in order to complete your graduate degree. For instance, before you can begin to work in a research laboratory, you must first have successfully completed chemical laboratory safety training (<http://www.depts.ttu.edu/chemistry/Safety/index.php>).

As another example, all Ph.D. students must successfully complete a graduate level course focused on research ethics and/or RCR (p. 7). Note that *all* graduate students supported on federal grants must receive such training; consult your advisor, the TTU Ethics Center (742-1506), or the TTU Office of Responsible Research (742-3904) for further details.

The two TTU offices mentioned just above are always available to you if you have questions or concerns. General queries are more suited to the former office, whereas specific issues are best addressed to the latter. Concerns of a more personal or sensitive nature, particularly if they involve a Research Advisor or other direct supervisor, can be addressed to the TTU Student Resolution Center (742-SAFE), without fear of reprisal. More details may be found on their website, <http://www.depts.ttu.edu/studentresolutioncenter/>.

In addition to these resources, there is much information that can be found on various TTU websites, and in various downloadable TTU Operating Procedure (OP) documents. Students must adhere to all guidelines and standards as discussed in the Texas Tech University Code of Student Conduct and Operating Procedure on Student Misconduct, which may be found at the websites listed below.

<http://www.depts.ttu.edu/studentjudicialprograms/conductcode.php>
<http://www.depts.ttu.edu/opmanual/OP34.12.pdf>
<http://www.depts.ttu.edu/opmanual/OP34.04.pdf>

Further details regarding acceptable student conduct may be found here:

<http://www.depts.ttu.edu/studentconduct/academicinteg.php>
<http://www.depts.ttu.edu/vpr/integrity/index.php>

http://www.depts.ttu.edu/dos/docs/entire_student_handbook.pdf

Finally, here are some sources that discuss plagiarism and intellectual property:

<http://www.depts.ttu.edu/vpr/faculty/scholarly-messenger/stories/Plagerism.php>

<http://www.depts.ttu.edu/opmanual/OP74.04.pdf>

B. Registration Requirements, Coursework, and Grading

Registration Requirements

1) University Enrollment Requirements

The credit hour minimum for registration is governed by Texas Tech University Operating Policy and Procedures Manuals, OP 64.02, which states

Full-time Study: “Students must be enrolled full time (at least 9 hours in each long term, 3 hours in each relevant summer session) to be eligible to hold fellowships, teaching assistantships, graduate part-time instructorships, research assistantships, or other appointments designed for the support of graduate study, as well as to qualify for certain types of financial aid. All international students are required by law to have full-time enrollment in every long semester. Graduate students designated **PGRD** (those who have earned an undergraduate degree but who will take only undergraduate courses) may not be appointed to teaching assistantships, graduate part-time instructorships, or research assistantships, as noted in the *Graduate Catalog*. If a student is devoting full time to research, utilizing university facilities and faculty time, the schedule should reflect at least 9 hours enrollment (at least 3 hours in each summer session). Enrollment may include research, individual study, thesis, or dissertation. *Exceptions to full-time enrollment for employment purposes require approval by the graduate dean.*”

Continuous Enrollment: “Each student who has begun thesis or dissertation research must register in each regular semester and at least once each summer until the degree has been completed, unless granted an official leave of absence from the program for medical or other exceptional reasons.”

2) Chemistry and Biochemistry Seminar Enrollment Requirements

M.S. Students: Registration in two different Fall semesters (CHEM 5101) and two different Spring semesters (CHEM 5102) is minimally required. Ordinarily this requirement is fulfilled during the first two years of graduate study. However, if the literature seminar requirement is not satisfied at the end of the fourth semester of enrollment, continued enrollment in CHEM 5101 and/or CHEM 5102 is required until the literature seminar requirement is satisfied.

Ph.D. Students: Registration in two different Fall semesters (CHEM 5101) and two different Spring semesters (CHEM 5102) is minimally required, and thereafter until admission to candidacy. Ordinarily this is fulfilled during the first two years of graduate study. However, if admission to candidacy requires more than two full calendar years, or if the literature seminar requirement is not satisfied by the end of the fourth semester of enrollment, continued enrollment in CHEM 5101 and/or CHEM 5102 is required until these other requirements are satisfied.

3) Chemistry and Biochemistry Ethics/RCR Training Requirements

Ph.D. Students: The Ph.D. degree will require successful completion of a graduate course focused on research ethics and/or RCR. By “graduate course” is meant an academic course offered for graduate credit (at least one hour) at Texas Tech University. In most cases, it is expected that this will be CHEM 5104, Lab Safety and RCR, or PHIL 5125, Research Ethics. However other related TTU (or non-TTU) academic courses may be substituted, with the approval of the Graduate Affairs Committee. By “successful completion” is meant a grade of A, B, or C.

M.S. Students: Although there is currently no formal departmental ethics/RCR training requirement for M.S. students, completion of CHEM 5104, Lab Safety and RCR or PHIL 5125 is nevertheless strongly recommended (though this will *not* count towards the 15 total credit hour science lecture course requirement).

4) Scientific Writing Requirement

Texas Tech University is a top research institution, and as such encourages scientific publication of the research being conducted in this department. Thus, all Ph.D. students are required to complete a three-credit-hour departmental scientific writing course, with the goal of completing an actual scientific paper for publication, by the end of the sixth long semester. This course should be CHEM 5304 (writing section) or an approved equivalent. Those students who submit a scientific paper for publication by the end of their fifth semester—as first or last author, and on a research project conducted in our department—are exempt from this requirement. All M.S. students are also strongly encouraged to take a scientific writing course, but are not required to do so.

5) Additional Registration Requirements

The Graduate School requires a minimum of 30 hours of graduate work for the Master's Degree and a minimum of 72 hours of graduate work for the Ph.D. Degree. Most students must take more than the minimum to complete their degrees—but at the same time, are discouraged from taking too long a time. ***All students enrolled beyond 130 credit hours will be automatically disqualified from receiving summer departmental support and will be assigned the lowest priority for support during the academic year.*** Moreover, Ph.D. students enrolled beyond 99 doctoral hours must submit a justification to the Graduate School each semester, to ensure that they are making progress toward their degree, and run the risk of being dismissed if they are not. They may also incur addition fee and/or tuition charges. Note that students who already have an M.S. “start the clock” with a certain number of doctoral hours, at the start of their Ph.D. programs. On the basis of 9 hours per long semester and 3 hours per summer session, Ph.D. students will have a bit more than four years, if they already have an M.S. Degree, and a bit more than five years, if they do not have an M.S. degree, to complete their degree program.

A typical 9 credit hour course load for first-year students is two or three lecture courses, a varying number of research credit hours (CHEM 7000), the seminar course, and an ethics course. After the first year, a typical course load is one or two lecture courses, research (CHEM 7000), and the seminar course. Within a year or two of graduation, as students approach the writing of their thesis or dissertation—i.e., after the second year for M.S. candidates, or typically the third or fourth year for Ph.D. candidates—students may begin enrollment in CHEM 6000 (thesis hours) or CHEM 8000 (dissertation hours). Ph.D. students cannot enroll in CHEM 8000 (dissertation hours) until after they

have been admitted to candidacy. In any case, once CHEM 6000/8000 enrollment has begun, a student must continue to enroll in at least one credit hour of CHEM 6000/8000 for every semester thereafter, until completion of the degree.

During the summer, when few if any graduate lecture courses are offered, the typical course load is for thesis/dissertation and research.

Grading

A grade of “CR” (for “credit”) is assigned for the thesis (CHEM 6000) or dissertation (CHEM 8000) credit hours taken each semester, while a letter grade (from “A” to “F”) is assigned for CHEM 7000 credit hours taken each semester. A letter grade is assigned for the thesis or dissertation credit hours after the student has passed his/her final oral examination. The CHEM 7000 grade is assigned for first-semester students by the Graduate Advisor, based on the effort that the student has made in interviewing prospective Research Advisors. Once a student has chosen a Research Advisor, then it is that Research Advisor who assigns the student's grade in CHEM 7000, based upon that student's effort and progress on his or her research project. Note that *all students must complete qualified Laboratory Safety Training before being allowed to work in a research lab and to register for CHEM 7000.*

Course Offerings

The Graduate Catalog lists the courses offered by the department, as well as graduate-level (i.e. with numbers of 5000 or greater) courses offered by other departments on campus. A limited number of graduate-level courses from departments other than the Department of Chemistry and Biochemistry can be taken and counted toward a chemistry graduate student's degree plan. Each division also has lecture courses that are required for students specializing in that area (for both M.S. and Ph.D., unless otherwise stated):

<u>division</u>	<u>courses</u>
Analytical Chemistry (at least two req'd, only for Ph.D.)	Advanced Analytical Chemistry (CHEM 5314) Analytical Separation Science and Tech. (CHEM 5318) Analytical Spectroscopy (CHEM 5320) Electrochemical Analysis (CHEM 5319)
Biochemistry	Any five, 5000-level CHEM courses designated as “Biochemistry”.
Chemical Education	see the section entitled “Requirements for M.S. and Ph.D. Degree with Specialization in Chemical Education.”
Chemical Physics	see the section entitled “Requirements for M.S. and Ph.D. Degree with Specialization in Chemical Physics.”
Inorganic Chemistry (each req'd only for Ph.D.)	Advanced Inorganic Chemistry I (CHEM 5301) Advanced Inorganic Chemistry II (CHEM 5302)
Organic Chemistry	Advanced Organic Chemistry I (CHEM 5321)
Physical Chemistry	Intro to Quantum Chemistry (CHEM 5342)

In addition, each division offers, at various times, “topics” courses (CHEM 5304 Topics in Chemistry), with specific sections dedicated to each division or topic. CHEM 5304 may be repeated for credit if a different topic is covered. Indeed, different sections of CHEM 5304, each covering a

different topic, may be taken in the same semester. Note that there is also a one-credit-hour special topics course, CHEM 5104.

The Biochemistry Laboratory (CHEM 3313) taught each Spring semester, is recommended for all biochemistry students who did not have a biochemical methods course as an undergraduate. (Enrollment in this course is at the discretion of the student and his or her research advisor.) This course does not count toward required hours.

Transfer of Graduate Credits from Other Institutions

If you have earned credit for graduate courses at other institutions (not including degrees that were 3 year BS/2 yr. MS) that are equivalent to ones offered in our department, then you may petition to have these courses included in your degree program. In order to initiate course transfers, fill out the “Course Transfer Request” form on the departmental website under “Current Graduate Students”, attach the appropriate documentation and give it to the Graduate Advising Assistant. This information will be conveyed to the division normally involved in teaching this course along with the scores on your diagnostic exam. You will be informed of the division's decision on your request through a memo from the Graduate Advisor. Final approval is decided at the Graduate School.

Lecture Course Requirements

For the M.S. degree in specializations different than chemical education, a minimum of 15 science lecture course hours are required. Most lecture courses are worth three credit hours, although increasingly, one-credit-hour lecture courses are now being offered. At least 12 of the 15 credit hours must come from three-credit-hour courses, i.e. three one-credit-hour lecture courses may be used for the remainder. The ethics and seminar courses do not count as science lecture courses.

For the Ph.D. degree in specializations different than chemical education, a minimum of 18 science lecture course hours are required, of which at least 15 hours must come from three-credit-hour courses. However, an additional requirement for Ph.D. students is that the combined hours from lecture, ethics, and seminar courses must total at least 24.

If allowed by the division and research advisor, some science lecture courses outside of the division and/or department may contribute to the above totals—although the Graduate Catalog stipulates that these may be included only “if they provide coherent support for the program courses in the major,” and that “courses listed for the major will be primarily in one academic program.” For the M.S. and Ph.D. degrees with a specialization in chemical education see the section entitled “Requirements for M.S. and Ph.D. Degree with Specialization in Chemical Education.”

The choice of which courses you should take in order to fulfill your coursework requirements will be made by you, based on your area of specialization, the requirements that the division of your area of specialization may make, and on the special training that your research project may require. You should seek the advice of your Research Advisor.

In summary, graduate credit hours must be distributed so that there are at least
Masters Candidates:

15 graduate level science lecture course hours

4 hours in graduate seminar (CHEM 5101 and/or 5102; one credit hour per semester)

5 hours in research (CHEM 7000), and

6 hours in Master's Thesis (CHEM 6000)

Doctoral Candidates:

24 graduate-level science lecture, writing, ethics, and seminar course combined hours:

18 science lecture course hours;

3 scientific writing course hours (CHEM 5304 (writing section), or approved substitute)
(p.7);

4 seminar course hours (CHEM 5101/5102);

1 ethics course hour (CHEM 5104 Lab Safety & RCR or approved substitute)

36 hours in research (CHEM 7000), and

12 hours in Doctoral Dissertation (CHEM 8000)

C. Additional Requirements for the M.S. and Ph.D. Degrees

An explicit checklist of requirements for each of the two degrees can be found on pp. 24-25 of this Handbook; you and your Research Advisor should each maintain a copy in order to ascertain your progress toward the degree. Also, be sure to consult the Graduate Catalog for the year that you entered the program to determine the Graduate School requirements that you must meet.

II. DISCUSSION OF DEGREE REQUIREMENTS

A. Diagnostic Examination Requirements

Each entering graduate student must demonstrate sufficient working knowledge of basic undergraduate chemistry in their area of specialization, and must be assessed in two other areas of chemistry, as determined by scores on “diagnostic” examinations. These are organized in two tracks. For most students they will be the standardized, multiple-choice tests written by the American Chemical Society. In format, these resemble the advanced chemistry subject GRE exam.

For students pursuing biochemistry, who possess an undergraduate degree that emphasized biology over chemistry, there is a special series of diagnostic exams: Biological Chemistry, Parts 1, 2, & 3.

- Part 1 addresses biochemistry including the chemical and physical properties of protein enzymes, nucleic acids, carbohydrates, lipids and membranes.
- Part 2 addresses metabolism including bioorganic chemistry pathways and their regulation.
- Part 3 addresses cell and molecular biology.

Students who enter the Graduate Program with combined general GRE scores (verbal + quantitative) of at least 300 (1100 on the old GRE scale) and an advanced chemistry subject GRE score in the 80th percentile, are exempt from taking the diagnostic examinations. Students specializing in Biochemistry are exempt from the Biological Chemistry diagnostic requirement* if they have combined general GRE scores of at least 300 and an advanced biochemistry, cell and molecular biology subject GRE score in the 80th percentile. Students specializing in chemical physics are exempt from the requirement of taking and passing the physical chemistry diagnostic exam, if they demonstrate a combined general GRE score of at least 300 and an 80th percentile or higher ranking on the physics subject GRE; however, these students must still take two additional chemistry diagnostic exams in other areas.

Apart from the above exceptions, all entering graduate students must take three diagnostic exams at their first opportunity after arriving at Texas Tech, one of which should be in their area of specialization. If the exam in the specialization area is not passed in the first attempt, the student will

be provided with a second chance to pass this exam, at the next available opportunity approximately one semester later. All students *must* pass the diagnostic exam in their specialization area within these first two opportunities, in order to remain in the graduate program in the Department of Chemistry and Biochemistry. The exams are offered by each of the divisions of the Department of Chemistry and Biochemistry prior to registration for each fall and spring semester, and at the end of the spring semester. Each exam is comprehensive, three hours in length, and covers undergraduate material only. Each student must select the three fields in which he/she will take the diagnostic exams according to the following requirements:

<u>Area of specialization:</u>	<u>Required Exams:</u>
Analytical Chemistry	pass Analytical Chemistry, take any two others
Biochemistry*	pass Biochemistry, take any two others. Physical Chemistry for Biological Sciences may be substituted for the regular Physical Chemistry exam.
Chemical Education	see "Requirements for M.S. and Ph.D. Degree with Specialization in Chemical Education."
Chemical Physics	pass Physical Chemistry, take any two others
Inorganic Chemistry	pass Inorganic Chemistry, take any two others
Organic Chemistry	pass Organic Chemistry, take any two others
Physical Chemistry	pass Physical Chemistry, take any two others

*Students pursuing biochemistry may opt to take the Biological Chemistry diagnostic exam track. This option is available only to biochemistry students. If you are uncertain as to your area of specialization, you should not take this track. A successful completion cannot be achieved by combining passes from the Biological Chemistry series with passes from the other track of diagnostic examinations. Instead, there are three ways to pass the Biological Chemistry series:

- (a) 50% or better on all three Biological Chemistry exams, –OR–
- (b) 60% or better on two out of three Biological Chemistry exams, –OR–
- (a) 75% or better on one out of three Biological Chemistry exams

If you do not pass the diagnostic exam in your specialization area on your first attempt, then you must engage in self-study (possibly including not-for-credit enrollment in an undergraduate-level course) in that subject prior to retaking the exam the next time that it is offered.

Please note the following additional information relating to diagnostic requirements:

- 1) Graduate students specializing in biochemistry and who have not taken an undergraduate laboratory course in biochemistry (or do not have laboratory experience in biochemistry from prior graduate-level research work) must take CHEM 3313 ("Biological Chemistry Lab," offered in the Spring), even if they have passed the Biochemistry diagnostic examination. This CHEM 3313 course will not count toward the student's graduate degree.
- 2) Entering students who petition the Department to have graduate-level courses that they have taken elsewhere transferred for credit toward their Ph.D. program will have their diagnostic exam performances scrutinized as part of the approval process.

B. Choosing a Division, Research Advisor, and Advisory Committee

Your Division

At the time you enter the graduate program, you will also select a Division of the department that best represents your area of specialization. This choice will determine your specific diagnostic exam, cumulative exam, seminar, and course requirements. You may choose a Division other than that of your Research Advisor, but your choice should be appropriate for your research project. The departmental Divisions are: Analytical Chemistry, Biochemistry, Chemical Education, Inorganic Chemistry, Organic Chemistry, and Physical Chemistry.

Your Research Advisor

During your first long semester, you must find a Research Advisor, the professor with whom you will do research work in your graduate career. This professor becomes your primary advisor and is in charge of your work and your program. Your Research Advisor is the key person in your graduate work. To acquaint yourself with the research activities of the faculty, you must first meet with at least three professors. The form, "Interview of Prospective Research Advisor" can be found on the departmental website under "Current Graduate Students"; it should be signed by all the professors with whom you interview. You must return the form to the Graduate Advising Assistant, with at least three faculty signatures, by the end of the 10th week of class.

By the end of your first long semester, you should have found a professor with whom you wish to work and who has agreed to mentor you. A second, "Research Advisor Selection" form, must be signed by both yourself and your Research Advisor, and turned in to the Graduate Advising Assistant by the last day of classes of your first long semester. If you are having unusual difficulties finding a Research Advisor, you should discuss the matter with the Graduate Advisor well in advance of the last day of classes.

You are urged to consider all factors carefully before making this important choice. It is often helpful to talk to experienced graduate students, especially those working with the professors being interviewed. Feel free, also, to discuss this with the Graduate Advisor. Remember, also, that many professors have research projects in areas outside the area of their normal teaching duties. Please note that *your choice of Research Advisor requires final approval by the Department Chair.*

Your Advisory Committee

The Advisory Committee is the group of faculty who, along with your Research Advisor, will evaluate your progress toward your degree, offer guidance on your research project, and assess your qualifications for the degree via oral examination.

The Advisory Committee for the Master's degree must consist of at least *two* individuals, your Research Advisor (the chairperson of the committee) and at least one other member of the Chemistry and Biochemistry faculty.

The Advisory Committee for the Doctoral degree must consist of at least *three* individuals, your research advisor (the chairperson) and at least two other faculty members. There should be no more than 5 members on your committee. Your committee is typically made up of faculty from the Department of Chemistry and Biochemistry, but your particular research project may merit the inclusion of faculty from other departments.

You choose your Advisory Committee by considering, with the advice of your Research Advisor, a list of faculty whom you think would be most appropriate (based on the nature of your research project), then asking each of those faculty if he/she would be willing to serve on your committee. (In some cases, a faculty member will decline serving on your committee due to impending absences from the department or other circumstances). The members of your committee will be listed on the degree program form that you will submit to the Graduate School, through the Graduate Advising Assistant.

If a member of your committee leaves the university, or for some other reason can no longer serve on your committee, then you can replace him/her with another faculty member, but must notify the Graduate School of this change by submitting a “Change of Degree Plan” form which must be signed by the Graduate Advisor. The “Change of Degree Plan” form can be obtained in the Graduate Advising Office, Room 37.

C. Degree Program Forms

In order to be approved by the Graduate School for completion of your degree, you must submit a completed degree program form, through the Graduate Advising Assistant, according to the deadlines indicated on pages 24-26. These forms (one for the M.S. and one for the Ph.D. degree) require, in addition to your name and address, the following:

- Your thesis/dissertation topic (a preliminary *title* for your thesis/dissertation)
- The names of the members of your Advisory Committee
- A list of the courses that you have taken, or intend to take, in order to fulfill the coursework requirements for the degree
- Your expected graduation date, which will be May, August, or December of some year in the future.

Note that *anything* designated on your degree program—thesis/dissertation title, Advisory Committee members, courses, graduation date—can be changed by submitting a signed (by the Graduate Advisor) “Change of Degree Plan” form to the Graduate School.

The degree program forms are straightforward to complete, but you should feel free to show the Graduate Advisor a rough draft before you submit the final version for his or her approval. Samples of completed forms can be found in Room 37. Blank fillable forms are on the departmental website under “Current Graduate Students”.

One thing to note about your degree program is that *the Department of Chemistry and Biochemistry does not allow that you choose a minor area of study.*

D. Literature Seminar Requirements

The requirements for both the M.S. and Ph.D. graduate degrees include the presentation of one acceptable literature seminar by the end of the fourth long semester. The seminar requirement is satisfied by the formal presentation of a 50-minute lecture on a specific topic that you have chosen in your major area that is not directly related to your research project. Each seminar is presented as a divisional seminar, but it must be formally announced to the department as a whole and be open for attendance by all interested listeners. Most divisions require that a written abstract of the seminar

topic be prepared for distribution at the time of the seminar; if so, you must first submit this abstract to iThenticate (see Research and Future Work Exam, p.14), and then give the results to your Research Advisor, prior to your seminar.

You should discuss the appropriateness of your chosen seminar topic with your Research Advisor and seek his/her advice during the preparation of your seminar. Furthermore, you should make a special effort to arrange for the members of your Advisory Committee to attend your seminar. The faculty attending your seminar will evaluate your performance, after which your Research Advisor will notify the Graduate Advisor when you have successfully completed this requirement. In order to assist your Research Advisor in this, present him or her with a copy of the "Report of Literature Seminar" form which can be found on the departmental website under "Current Graduate Students"; he/she must sign the form and submit it to the Graduate Advising Assistant.

E. Qualifying Examination for Ph.D. Students

The Qualifying Examination for the Ph.D. degree in Chemistry consists of the Research and Future Work Examination, together with the Cumulative Examinations. Exact deadlines (indicated in the summary on p. 26) exist for each part of the Qualifying Examination, and the failure of a student to abide by these deadlines will result in his/her disqualification from the Ph.D. program of the Department of Chemistry and Biochemistry. Success in both parts will qualify the student for admission to candidacy. A suitable form must be filled out and signed by the Research Advisor, and submitted first to the Graduate Advising Office, and then to the Graduate School.

Research and Future Work Examination

By the end of a student's second calendar year as a graduate student in the department, the student must submit a detailed written report of his/her research project to his/her Advisory Committee, and meet with the committee to orally discuss the research project and answer questions as part of the oral examination. The written report should be 6-10 pages long, and be subdivided into sections suitable for a short research proposal (e.g., "Aims", "Background", "Preliminary Results", "Research Plan", etc.) The oral examination should consist of a 30-45 minutes presentation by the student, with the subsequent question-and-answer session not necessarily limited to the presentation topics, but also designed to encompass the broader, contextual scope of the student's scientific understanding, vis-à-vis the research project. Both written and oral components of the Research and Future Work Examination must include substantive discussion of both the preliminary research progress conducted thus far, as well as future work proposed as part of the student's Ph.D. research project. Students should enlist the aid of their Research Advisors during their preparation for the examination. Having established a framework, baseline, and benchmarks for expected outcomes, students who have passed the Research and Future Work Examination are encouraged to meet with their Advisory Committees once per year.

The primary purpose of the Research and Future Work Examination is to evaluate the development of the student into a Ph.D.-caliber scientist. Thus the committee will expect the student to demonstrate:

- scholarship (development of a strong background in the subject),
- ability (development of expertise in the techniques required by the project),
- communication skills (development of expertise in presenting the research subject and discussing it on an *ad hoc* basis), and
- creativity (development of the ability to solve problems independently and to foresee

research directions which may be revealed by the research project).

A secondary purpose of the Research and Future Work Examination is to allow the various committee members to critique the student's research project, and to offer advice about its design, direction, and feasibility.

Prior to the oral examination session, the student must submit the written component to iThenticate, and then give the results to all members of the Advisory Committee. iThenticate is software that automatically checks a given document against many related documents found on the web, in order to ensure originality. TTU graduate students may submit their own works to iThenticate through the TTU library, at the following website:

<http://library.ttu.edu/ithenticate/ithenticate.php>.

Upon completion of the oral examination session, the committee will vote on whether or not the student has demonstrated sufficient development as a pre-doctoral student to assure ultimate success in attaining the Ph.D. degree. If the committee votes that the student has *not* demonstrated sufficient development, then it will recommend that the student be disqualified from pursuing a Ph.D. degree in the department, and the Graduate School will be notified that the student has failed his/her qualifying examination. In some cases, the committee might vote that a student retake all or part of the examination (e.g. repeat the oral part or rewrite the written part).

When a student has successfully completed the Research and Future Work Examination, he/she must have his/her research advisor and committee sign a "Report of Research and Future Work Examination" form (a blank copy of this form is on the departmental website under "Current Graduate Students"). The completed form must then be submitted to the Graduate Advising Assistant.

Any student who does not successfully complete his/her Research and Future Work Examination by the end of his/her second calendar year (August 31 for Fall entering students, December 31 for Spring entering students) will fail the qualifying examination, and will be disqualified from pursuing the Ph.D. in the Department of Chemistry and Biochemistry.

F. Cumulative Examinations

Cumulative examinations are administered approximately once per month during the academic year (September through April), on Saturday mornings, according to a schedule distributed to students and posted on the Departmental website under "Current Graduate Students" before the beginning of the academic year. A total of three cumulative examinations will be offered each long semester.

Each division in the department, including Chemical Education, will offer a cumulative examination on each scheduled date. On a given exam day, a student may elect to take and turn in exams from up to two different divisions. In every case, however, the student must decide at the START of the exam session, which exam or exams he or she plans to take. The student may not ask for a second exam AFTER the exam session has begun. It is permissible for students to attempt a cumulative examination in an area outside of their specialization, although it is expected that the majority of the exams taken will be within the specialization area (but see "Requirements for M.S. and Ph.D. Degree with Specialization in Chemical Education," if this is applicable).

The purpose of the cumulative examinations is to encourage and measure the development of a student's comprehension of advanced-level topics in his or her area of specialization—as a means of

gauging his or her likelihood of success in completing the doctoral degree, and potential to become a productive member of the scientific community, in the specialization area. The questions may vary from detailed essay questions to calculations to short answers. A common format for a cumulative examination is a series of questions about some recent journal article (or articles) that must be answered in blue books which accompany the examination. In general, the exams will emphasize data interpretation and problem solving (i.e. given these data, tell us what happened? How did it happen? How could you change what happened?) Depending upon the division giving the exam, the topic of a cumulative examination may or may not be announced beforehand (different divisions follow different procedures in this regard). A file of cumulative examinations is maintained in Room 37 for students to examine in order to assess typical questions.

The departmental rules concerning cumulative examinations are as follows:

- a) Starting with the first month of the first semester that a student enters the department's Ph.D. program, a student must pass at least one cumulative exam by the last month of his/her second long semester in the Ph.D. program, and he/she must pass four cumulative examinations by the last month of his/her fourth long semester in the Ph.D. program.
- b) A student is allowed to attempt no more than a total of 12 cumulative examinations. Each examination paper (bluebook) handed in by a student at the end of an examination period is counted toward this total.
- c) If a student has not passed the required number of cumulative examinations within the time and/or number constraints indicated above, then the student will have failed the qualifying examination, and will be disqualified from pursuing the Ph.D. degree in the Department of Chemistry and Biochemistry.
- d) Students are permitted to attempt an exam(s) and then leave the testing room with a copy of that exam(s) prior to the end of the testing period, *without* submitting the exam for grading. Exams that are not submitted to the proctor will not count as an attempt; however, exams cannot be taken from the testing room and then later turned in to the grader after the testing period has ended.

Note that students are allowed to hand in more than one completed cumulative examination paper on a single Saturday, i.e. more than one exam may be attempted per exam date. However, *all* exams that are handed in count toward the 12-examination limit; thus in such cases the student may meet his or her 12-examination limit *before* the end of his or her fourth long semester. Conversely, a student who turns in no exams on a given Saturday, whether he/she was present or not, will not be given extra exam-taking opportunities.

G. Final Oral Examination (Thesis/Dissertation Defense)

Final Oral Examination for M.S. Degree

The Final Oral Examination consists of an oral presentation, in seminar format, of your research results, followed immediately by an oral examination session in which your committee members ask you questions about your research project and related subjects. The presentation for the M.S. degree does not have to be open to the public; typically, it is made to your committee. You must present copies of your thesis to your committee **at least a week before** the oral examination. Following the oral examination, your committee will decide if you have passed the examination or not, and they will recommend changes in your thesis based on their reading of it. When your committee has decided that you have passed the examination and you have corrected the thesis according to their instructions, you must prepare a final copy of your thesis and submit it to the Graduate School for

their approval. It is important that you pay close attention to the deadlines and thesis format requirements set by the Graduate School when you are completing your M.S. degree requirements.

As soon as a date and time has been arranged with your committee members for your Final Oral Examination, you need to reserve the room through the appropriate departmental personnel. The Final Oral Examination must be announced on the weekly departmental seminar list. The title, as well as a copy of an abstract, should be given to the appropriate departmental personnel by Thursday of the week preceding your Final Oral Examination.

Final Oral Examination for Ph.D. Degree

The Final Oral Examination must be announced via a formal announcement that follows format guidelines established by the Graduate School. The examination may not be administered until at least *three weeks* after the announcement has been submitted to the Graduate School. Copies of this announcement will be mailed throughout the campus. Note ***that the Graduate School requires you to select a Graduate Dean's Representative***—a member of the TTU graduate faculty who is not a member of your department—to serve as a participant in the final oral examination and report to the Graduate School about the examination. As stated in the Graduate Catalog, ***your Advisory Committee must approve the first written draft of the dissertation before the oral examination is scheduled.***

The final oral examination for the Ph.D. degree will consist of a *public* presentation of your research results in the form of a 50-minute seminar. This presentation will be followed by a period of questions from the public audience, then a closed-door oral examination by your Advisory Committee. You must present a copy of your dissertation to each member of your committee (including the dean's representative) ***at least one week*** before the date of your final examination. Following the oral examination, your committee will decide if you have passed the examination or not, and they will recommend changes in your dissertation based on their reading of it. When your committee has decided that you have passed the examination and you have corrected the dissertation according to their instructions, you must prepare a final copy of your dissertation and submit it to the Graduate School for their approval. Your Research Advisor will notify the Graduate School at this time that you have successfully completed your final oral examination. It is important that you pay close attention to the deadlines and dissertation format requirements set by the Graduate School when you are completing your Ph.D. degree requirements.

As soon as a date and time has been arranged with your committee members for your Final Oral Examination, you need to reserve the room through the appropriate departmental personnel. The Final Oral Examination must be announced on the weekly departmental seminar list. The title, as well as a copy of an abstract, should be given to the appropriate departmental personnel by Thursday of the week preceding your Final Oral Examination.

To clarify the process by which a doctoral student obtains preliminary approval of his/her dissertation from his/her doctoral committee members prior to the scheduling of his/her Final Oral Examination with the Graduate School, the following procedure is established.

- 1) The committee members will provide a preliminary evaluation of the dissertation within seven days of its acceptance from the candidate for review.
- 2) If a committee member feels that major changes are required, this will be communicated to the candidate within the seven-day period. Such major changes

will have to be made by the student and the committee members will have another seven days to evaluate the revised dissertation once they accept it for review.

- 3) If only minor changes are required, the committee member will give preliminary approval to the dissertation. (Note that some modifications of the dissertation will undoubtedly still be required after the dissertation defense. However, these will be of a relatively minor nature and will not involve, for example, the rewriting of an entire chapter.)
- 4) If the candidate receives no communication from a committee member by the end of the seven-day period, it will be assumed that committee member has given preliminary approval to the dissertation.

III. APPENDICES

A. Requirements for M.S./Ph.D. Degree with Specialization in Chemical Education

For students wishing to pursue a graduate degree with a specialization in Chemical Education, the requisite guidelines are somewhat different from the other specialization areas, as explained in detail in this section. In all cases, the goal is to provide the student with a firm grounding in both chemistry or biochemistry and education, while not extending the student's stay much past that of a chemistry/biochemistry degree in a traditional area.

The M.S. degree program in Chemical Education is designed for students interested in teaching careers at the secondary level, at the two-year college level, as well as at four-year colleges and universities. This degree is appropriate for high school teachers wishing to expand their content and educational backgrounds. However, it is also appropriate for those individuals wishing to teach in a post-secondary education setting. Typically, those interested in pursuing a Ph.D. in a traditional area of chemistry with the goal of pursuing an academic career at a liberal arts college or university will find that the M.S. in Chemical Education gives them a competitive edge in the job market because of their experience with education. In any case, the M.S. degree in Chemical Education is a stand-alone (i.e. "self-contained") degree program.

The Ph.D. degree program in Chemical Education is designed for students interested in research and/or teaching careers at the secondary level, at the two-year college level, as well as at four-year *and Ph.D. granting* colleges and universities. As is typical of many other such programs, students interested in pursuing a Ph.D. in Chemical Education at Texas Tech *must first obtain an M.S. in a "traditional" area of chemistry or biochemistry*, either from Texas Tech or from another institution that is acceptable to the Graduate Affairs Committee. Those students who obtain the M.S. from Texas Tech should notify the Graduate Advisor and the M.S. Research Advisor as soon as possible of their intent to later pursue the Ph.D. in Chemical Education at Texas Tech, once the M.S. is completed.

The academic requirements for the M.S. and Ph.D. degrees in Chemical Education are the same as those for the other specialization areas, except as explicitly discussed below.

Diagnostic Exams

As for the other specialization areas, all Chemical Education students must demonstrate their working knowledge of chemistry by taking three diagnostic exams upon arriving at Texas Tech. In addition, students pursuing the Chemical Education M.S., *or the Ph.D. after earning a traditional M.S. elsewhere*, must also take the ACS General Chemistry end-of-year exam as part of their diagnostic examination requirement. Passing requirements depend on the class of Chemical Education student, as listed below:

M.S. degree:	pass one diagnostic examination in any specialization area, –OR– pass ACS General Chemistry exam at 70 th percentile or higher.
Ph.D. degree (M.S. elsewhere):	pass diagnostic exam in M.S. specialization area, –OR– pass ACS General Chemistry exam at 70 th percentile or higher
Ph.D. degree (M.S. at TTU):	diagnostic exams taken <i>as M.S. student</i> under usual guidelines, i.e. pass one diagnostic examination in M.S. specialization area.

As for the other specialization areas, those students who do not pass the diagnostic exam requirement at the first available opportunity will have a second chance to do so.

Advisory Committee

The Advisory Committee for an M.S. student must consist of a minimum of two members, one of whom is the Research Advisor within the Department of Chemistry and Biochemistry, and the other whom is strongly advised (but not required) to be a tenure-acquiring faculty member from the College of Education.

The Advisory Committee for a Ph.D. student must consist of a minimum of three members, including the Research Advisor and at least one other faculty member from within the Department of Chemistry and Biochemistry, and a third member who is strongly advised (but not required) to be a tenure-acquiring faculty member from the College of Education.

Cumulative Examinations—Ph.D. Only

All Chemical Education Ph.D. students must pass four cumulative examinations, two of which must be specifically in the area of Chemical Education, and two of which must be in any other areas for which cumulative examinations are offered. Ph.D. students enrolling at Texas Tech with an M.S. must pass these exams according to the same timeline established for the other specialization areas—i.e., one by the end of the second long semester, and all four by the end of the fourth long semester.

Literature Seminar

As for the other specialization areas, the literature seminar must be successfully presented by the end of the fourth long semester. M.S. students, and Ph.D. students who received their M.S. elsewhere, must present their literature seminars to their *Advisory Committees*, rather than to their divisions (as there is no Chemical Education seminar *per se*). Would-be Ph.D. students receiving their M.S. degrees at Texas Tech present their literature seminars to their divisions, in accord with usual guidelines for M.S. students.

Research and Future Work Examination—Ph.D. Only

Ph.D. students enrolling at Texas Tech with an M.S. from elsewhere must complete this requirement within their first two calendar years, as for the other specialization areas. However, Ph.D. students pursuing the M.S. degree at Texas Tech will be given *three* calendar years after their initial arrival at Texas Tech, to fulfill this requirement. Although the latter class of student may well be taking some education courses during their time as M.S. candidates, particularly in the third year, the primary focus during this period will be the traditional M.S. area of specialization. As such, it would be inappropriate for such students to take the Ph.D. Research and Future Work Examination until some idea of a research project has been established with the Chemical Education Ph.D. Research Advisor (who may well be different from the M.S. Research Advisor).

Lecture Course Requirements

Lecture course requirements for the Chemical Education program are somewhat greater and more involved than for the other specialization areas, to accommodate the inherent interdisciplinary nature of the discipline, while also ensuring the rigorous training in chemistry and biochemistry necessary to achieve a graduate degree of this name. All M.S. and Ph.D. students in Chemical Education will be required to take a special one-credit-hour survey course, "Introduction to Chemical Education"

(CHEM 5104 Topics in Chemistry), within their first two calendar years at Texas Tech (three years for Ph.D. students pursuing the M.S. degree at Texas Tech). In addition, a certain number of lecture course credit hours must come from the Department of Chemistry and Biochemistry, and a certain number from education courses, with the breakdown depending on degree type, i.e. M.S. or Ph.D. Note that Ph.D. students enrolling at Texas Tech with an M.S. from elsewhere may petition to transfer their M.S. courses for graduate credit, in the same manner as for the other specialization areas (see p. 9).

The specific lecture course credit hour requirements are broken down as follows:

Masters Candidates:

16 graduate-level lecture course hours

- 1 hour: “Introduction to Chemical Education”
- 9 hours: Additional lecture courses from Chemistry and Biochemistry
- 6 hours: Additional lecture courses from College of Education

Doctoral Candidates:

24 graduate-level lecture course hours

- 1 hour: Ethics/RCR course
- 1 hour: “Introduction to Chemical Education”
- 13 hours: Additional lecture courses from Chemistry and Biochemistry
- 9 hours: Additional lecture courses from College of Education

The education courses must be chosen from the approved list below, or with special permission of the Research Advisor and Graduate Advisor. (The student may need to take required prerequisites in education, and should discuss this with an advisor in the College of Education). The courses may be set up in such a way as to provide a concentration (for example, in Quantitative Research Methods/Statistics or in Technology) or breadth, depending upon the research project and ultimate goals of the student.

Approved College of Education Courses

<i>Category/Course Number</i>	<i>Category/Course Number</i>
<i>Curriculum</i>	<i>Qualitative Research Methods</i>
EDCI 5320	EPSY 5379
EDCI 5321	EPSY 5382
EDCI 5335	EPSY 5385
<i>Educational Psychology/Testing</i>	EPSY 6304
EPSY 5332	EPSY 6305
EPSY 5653	<i>Quantitative Research Methods/Statistics</i>
EPSY 6302	EPSY 5380
EPSY 6303	EPSY 5381
<i>Education Theory</i>	EPSY 5383
EDCI 5371	EPSY 6301
EDCI 5386	<i>Technology</i>
EDCI 6320	EDIT 5322
<i>Higher Education</i>	EDIT 5326
EDHE 5342	EDIT 5341
EDHE 5343	EDIT 5342
<i>Math/Science Education</i>	
EDCI 5372	

EDCI 5373	
EDCI 5377	

B. Requirements for M.S./Ph.D. Degree with Specialization in Chemical Physics

The main goal of this specialization is to prepare students who wish to study chemical problems by the methods and theories of modern physics. This specialization includes courses in chemistry, physics, and mathematics and research on a suitable problem under the direction of a faculty member in the Department of Chemistry and Biochemistry or the Department of Physics. It is envisioned that a large fraction of students who choose the chemical physics specialization will be chemistry students with strong backgrounds in mathematics and physics. However, the academic requirements for the chemical physics specialization should make it also attractive to physics students. Because the coursework is difficult, this specialization will be recommended to students who are academically strong in chemistry, physics, and mathematics, as judged by transcripts and test scores.

Since this specialization will be administered in the Department of Chemistry and Biochemistry, the academic requirements are similar to those that are currently required in the other areas of chemistry. In particular, these requirements are the same as those for the Physical Chemistry specialization area, except as explicitly discussed below.

Diagnostic Exams

Chemical physics students in both the M.S. and Ph.D. programs must demonstrate their working knowledge of basic undergraduate chemistry and physics by taking three diagnostic exams upon arriving at Texas Tech, and passing the physical chemistry diagnostic exam within their first two opportunities. Chemical physics students may place out of the physical chemistry diagnostic requirement by scoring well on the physics subject GRE (p. 10), but must in this case still take two diagnostic exams in other areas.

Advisory Committee

The Advisory Committee for an M.S. student must consist of a minimum of two members, one of whom must be a tenure-acquiring faculty member within the Department of Chemistry and Biochemistry, and one who must be a tenure-acquiring faculty member from the Department of Physics. The Advisory Committee for a Ph.D. student must consist of a minimum of three members, two of whom must be tenure-acquiring faculty members within the Department of Chemistry and Biochemistry, and one who must be a tenure-acquiring faculty member from the Department of Physics.

Required Physics Courses

The students must show proficiency in Electricity and Magnetism and Mechanics by passing with a grade of B or better one course from Physics 3305-3306 (5315-5316) and Physics 4304 (5324), or the equivalent courses from other institutions. Students may receive *graduate credit* for *only two* of these courses. If taken for graduate credit, two of these courses will count as courses taken outside of the Department of Chemistry and Biochemistry, as described below.

Course Work

Masters Candidates: The 30 required graduate credit hours are distributed as follows:

- 15 graduate-level science lecture course hours
- 4 hours in graduate seminar (CHEM 5101 and/or CHEM 5102)
- 5 hours in research (CHEM 7000), and
- 6 hours in Master's Thesis (CHEM 6000)

Of the 15 lecture course hours, at least 9 must be taken within the Department of Chemistry and Biochemistry.

Doctoral Candidates: The 72 required graduate credit hours are distributed as follows:

- 24 graduate-level lecture and seminar course combined hours:
 - 18 science lecture course hours; 4 seminar course hours (CHEM 5101/5102);
 - 1 ethics course hour (CHEM 5104, PHIL 5125, or approved substitute);
 - 1 additional course hour [e.g. CHEM 5104 (not Lab Safety & RCR)]
- 36 hours in research (CHEM 7000), and
- 12 hours in Doctoral Dissertation (CHEM 8000)

Of the 18 lecture course hours, a maximum of 9 can be taken outside of the Department of Chemistry and Biochemistry.

It is anticipated that most of the lecture courses taken for the chemical physics specialization will be in physical chemistry, although some courses in other departments such as Physics and Mathematics will be accepted. Chemical physics students may also be allowed to substitute departmental physics or mathematics seminar courses for some of the Departmental Chemistry and Biochemistry seminars.

C. Checklist for the M.S. Degree Requirements in Chemistry

In Order to Earn a M.S. Degree in Chemistry, You Must:

<u>Do the Following</u>	<u>By the Following Deadline</u>	<u>Date Completed</u>
1.) Complete the Diagnostic Requirements (See Diagnostic Exam Requirements, p. 10)	On or before the second available opportunity (approx. one semester)	_____
2.) Interview at least three professors as prospective Research Advisors. Fill out "Prospective Research Advisor Interviews Form" (pp. 11-12).	By end of 10 th week of class. The form is on the departmental website under "Current Graduate Students"	_____
3.) Choose your Research Advisor. Fill out "Research Advisor Selection Form". (See pp. 11-12)	Last day of class, 1 st long semester The form is on the departmental website under "Current Graduate Students"	_____
4.) Fill out, obtain signatures on and submit the form "Program for Master's Degree" to the Graduate Advising Assistant, including specification of your Advisory Committee. (See Degree Program Forms, p. 27)	End of 1st long semester The form is on the departmental website under "Current Graduate Students". (See p 29, for example)	_____
5.) Complete an approved literature seminar to your division, and turn in a signed, "Report of Literature Seminar" Form. (See Literature Seminar Requirement, p. 13)	End of 4th long semester Give report found on our website under "Current Graduate Students" to the Graduate Advising Assistant.	_____
6.) Complete at least 15 credit hours of graduate-level science lecture courses, plus 4 hours of seminar (CHEM 5101-5102). (pp. 9-10)	Whenever completed <ul style="list-style-type: none"> • 4 hrs seminar 5101/5102 • 15hrs approved science lectures 	_____
7.) Complete at least 5 credit hours of CHEM 7000 and 6 credit hours of CHEM 6000 (Master's Thesis) (pp. 9-10)	Department registration requirements assure that this will be completed with extra credit hours to spare	_____
8.) Complete a research project as supervised by your Research Advisor, write up your results in a thesis which follows the Graduate School guidelines, undergo a final oral examination with your Advisory Committee and submit the requisite number of corrected copies of your thesis to the Graduate School according to the deadlines set by them each semester. (p. 16)	Graduate Advisor will turn in the "Thesis/Dissertation Successfully Completed Form" that is found on the departmental website under "Current Graduate Students"	_____
9.) Complete and submit the form, "Graduate Student Exit Survey" to the Graduate Advising Assistant	After successful completion of the thesis and before departing Texas Tech. Form is on the departmental website under "Current Graduate Students"	_____

D. Checklist for the Ph.D. Degree Requirements in Chemistry

In Order to Earn the PhD Degree in Chemistry, You must:

<u>Do the Following</u>	<u>By the Following Deadline.</u>	<u>Date Completed</u>
1.) Complete the Diagnostic Requirements (See Diagnostic Exam Requirements, p. 10)	On or before the second available opportunity (approx. one semester)	_____
2.) Interview at least three professors as prospective Research Advisors. Fill out "Prospective Research Advisor Interviews Form" (pp. 11-12)	By end of 10 th week of class. The form is on the departmental website under "Current Graduate Students"	_____
3.) Choose your Research Advisor. Fill out "Research Advisor Selection Form" (pp. 11-12)	Last day of class, 1 st long semester The form is on the departmental website under "Current Graduate Students"	_____
4.) Chose at least 2 but no more than 4 other faculty members to be on your Advisory Committee. (p.12)	End of 2nd long semester This is done on the "Program for the Doctoral Degree" form mentioned below.	_____
5.) Fill out, obtain signatures on, and submit the form "Program for the Doctoral Degree" to the Graduate Advising Assistant. (See Degree Program Forms, p. 28)	End of 2nd long semester The form is on the departmental website under "Current Graduate Students". There is an example at the back of this handbook.	_____
6.) Successfully Complete four Cumulative Examinations (See pp.16-17)	End of 2nd long semester for the first exam; end of fourth long semester for all four exams	_____
7.) Complete an approved literature seminar to your division, and turn in a signed, "Report of Literature Seminar" Form. (See Literature Seminar Requirement, p-.13-14)	End of 4th long semester Give report found on our website under "Current Graduate Students" to the Graduate Advising Assistant.	_____
8.) Submit a detailed written report to your committee, meet with them to give a 30-45 minute oral presentation. (See Research and Future Work Examination on p. 14)	End of second calendar year Fill out "Report of Research and Future Work Examination," get it signed by Research Advisor and turn in to Graduate Advising Assistant. This report can be found on our website under "Current Graduate Students.	_____
9.) Become admitted into candidacy for the doctoral degree. [The date is very important; see #12 on next page]	Research Advisor and the Graduate Office will submit your name for candidacy when you have passed your 4 th Cumulative Exam and your Research and Future Work Exam. Turn in form "Report of Research and Future Work Examination" to Graduate Advising Assistant.	_____

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|--|---|-------------------------|
| <p>10.) Complete at least 24 combined credit hours of graduate-level science lectures, ethics, and seminar courses; at least 18 must be from science lecture courses, at least 1 must be from an ethics course and at least 4 from seminar courses. (pp. 9-10)</p> | <p>Enroll in CHEM 5101/5102 each semester until admission to candidacy</p> <ul style="list-style-type: none"> • 1 approved ethics course • 18 hrs approved science lectures • 3 hrs scientific writing | <hr/> <hr/> <hr/> <hr/> |
| <p>11.) Complete at least 36 credit hours of CHEM 7000 and 12 credit hours of CHEM 8000 (Doctoral Dissertation) (pp. 9-10)</p> | <p>Department registration requirements assure that this will be completed with extra credit hours to spare within 4 years of the date admitted to candidacy</p> | <hr/> |
| <p>12.) Complete a research project as supervised by your Research Advisor, write up your results in a dissertation which follows the Graduate School guidelines, undergo a final oral examination (which has been announced to the entire Department of Chemistry and Biochemistry, and according to the Graduate School Guidelines) with your Advisory Committee and submit the requisite number of corrected copies of your dissertation to the Graduate School according to the deadlines set by them each semester. (p. 17)</p> | <p>Within 4 years of Date of Admission to Candidacy
Give Research Advisor “Report of Successful Oral Dissertation Defense” form that is on the departmental website under “Current Graduate Students”</p> | <hr/> |
| <p>13.) Complete and submit the form, “Chemistry Graduate Student Exit Survey” to the Graduate Advising Assistant</p> | <p>After successful completion of the dissertation and before departing Texas Tech. Form is on the departmental website under “Current Graduate Students”</p> | <hr/> |

E. Sample of Completed “Program for the Master’s Degree” Form

Student’s R#: R000000000

Projected Graduation Date: 5/2020

Student’s Name: Jones, Maria Curie

Program (drop down menu): MS

Major: Chemistry & Biochemistry

Area: Analytical

Advisor Committee Chair: Dr. May I. Pass

Other Committee Members: Dr. Del Max, Dr. Inverse Chiral, _____, _____

Thesis or Dissertation Title (or area of research for thesis or dissertation: "Electrophoresis of Carbohydrates:" or write topic of research

Coursework: Put down both courses you have taken, are taking and will take. Future changes will be made through a change in program form.

Major Courses (not including language):

CHEM 5101 2hours CHEM 5102 2hours CHEM 7000 5 hours CHEM 6000 6 hours CHEM 5104 1 hour Lab Safety and RCR CHEM 5314 CHEM 5304 - Mass Spectroscopy	CHEM 5315 CHEM 5318 CHEM 5319
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Non major courses (ie. Languages)

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Transfer Courses

Institution

Course: CHEM 532	University: Lone Star University
TTU Equivalent: CHEM 5320	
Course:	University:
TTU Equivalent:	
Course:	University:
TTU Equivalent:	

Signature of Research Advisor (Your Mentor)

Date:

Signature of Graduate Advisor (Bill Poirier or Current Grad. Advisor)

Date

F. Sample of Completed "Program for the Doctoral Degree"

Student's R#: R000000000

Projected Graduation Date: 5/2023

Student's Name: Jones, Maria Curie

Program (drop down menu): PHD

Major: Chemistry & Biochemistry

Area: Analytical

Advisor Committee Chair: Dr. May I. Pass

Other Committee Members: Dr. Del Max, Dr. Inverse Chiral, _____, _____

Thesis or Dissertation Title (or area of research for thesis or dissertation: "Electrophoresis of Carbohydrates:" or write topic of research

Coursework: Put down both courses you have taken, are taking and will take. Future changes will be made through a change in program form.

Major Courses (not including language):

CHEM 5101 2hours CHEM 5102 2hours CHEM 7000 5 hours CHEM 6000 6 hours CHEM 5104 Lab Safety and RCR CHEM 5314 CHEM 5304 - Mass Spectroscopy	CHEM 5315 CHEM 5318 CHEM 5319 CHEM 5304 – Electronics & Interfacing
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Non major courses (ie. Languages)

ESL 5310	
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Transfer Courses

Institution

Course: CHEM 532	University: Lone Star University
TTU Equivalent: CHEM 5320	
Course:	University:
TTU Equivalent:	
Course:	University:
TTU Equivalent:	

Signature of Research Advisor (Your Mentor)

Date:

Signature of Graduate Advisor (Dr. Poirier or Current Grad. Advisor)

Date

G. Divisional Policies Regarding Cumulative Exams

Cumulative Exams per division					
Questions:	Analytical	Biochemistry	Inorganic	Organic	Physical
Do you Advertise your topics in advance?	Yes	Yes	Yes	Writer of Exam will be made known	Yes; same list of topics used each year.
Do you give out a list of papers or textbooks to read?	Depends on topic. Some topics include specific books, chapters, or papers to read; others do not.	No	Sometimes, depending on who is writing the exam.	A list of topics that may be covered (not exhaustive / comprehensive) will be made available	No
Do you use many or one faculty's questions per exam?	One faculty member writes each exam.	Each cume has 5 questions, each written by a different faculty member.	Mostly just one faculty member, except for the instrumental methods cume, which could be written by 3-4 faculty members.	One faculty member writes each exam.	Each cume has 4 questions, each written by a different faculty member.
Do the exams writers rotate from one exam to next or always the same	Exam writing is rotated	Exam writing is rotated	Yes	Exam writing is rotated.	Exam writing is rotated.
Are students aware of who is writing the exam?	Yes	No	Yes	Yes	No
Do faculty grade their own exams/problems or not?	Each faculty member grades the problem(s) that they themselves wrote.	Each faculty member grades the problem(s) that they themselves wrote.	Each faculty member grades the problem(s) that they themselves wrote, but the exams are passed around for consensus of all faculty in division	Each faculty member grades the problem(s) that they themselves wrote.	Each faculty member grades the problem(s) that they themselves wrote.
What are the pass/fail cutoffs?	70%	50%, 20 points per question	70%	50-60%	60%, except for the general topics exam which is 50%.
Is this cutoff flexible?	Somewhat, if grader sees a cluster around 70% that he/she feels should pass	No.	Rarely, if all divisional faculty agree	Some flexibility is allowed in light of perceived difficulty of the exam and students performance on the exam	There is some flexibility, based on distribution of exam scores, which are passed around to the whole division for discussion.
Is the person/persons who make the final pass/fail decision the same as the grader?	Division consensus is solicited if a pass rate below 70% is proposed.	Yes	Division consensus is used to make final pass/fail decisions.	Division consensus is used to make final pass/fail decisions.	Division consensus is used to make final pass/fail decisions.
How much consistency is there in terms of grading	Consistency is maintained by having all division members look at all exams.	Some faculty members may write questions that are more difficult than others. However, overall consistency is maintained by having 5 (out of 7) division members contribute to each exam, in rotating fashion.	Consistency is maintained by having all division members look at all exams. If one faculty member feels a particular problem was graded too harshly, it is reviewed by all.	Consistency is maintained by having all division members look at all exams.	Some faculty members may write questions that are more difficult than others. However, overall consistency is maintained by having 4 (out of 6) division members contribute to each exam, in rotating fashion.
How much consistency is there in terms of format of exams?	All exams are similar in format.	All exams are similar in format.	To help with consistency, students are to answer 5 out of 8 questions usually. (60-65%)	All exams are similar in format.	All exams are similar in format.
Are there exams to study in Donna 's office	Very few, without answers.	3 or 4 exams, without answers.	No	Yes, with answers. However, since topics are not announced in advance, there may be variation across exams.	Yes, without answers.