CHEMISTRY

Students may earn the Master of Arts, Master of Science and Doctor of Philosophy in Chemistry.

Prerequisites for the M.A./M.S. degrees: A baccalaureate degree in chemistry from an approved college or university with an academic record meeting the standards established by TCU. Students who have majored in related areas will be considered if it is believed that the relevant undergraduate chemistry background can be acquired during the first year of graduate study.

To pursue the Ph.D. in Chemistry, a student must have earned a baccalaureate degree in chemistry from an approved college or university with an academic record meeting the standards established by TCU. Students who have majored in related areas will be considered if it is believed that the relevant undergraduate chemistry background can be acquired during the first year of graduate study.

General Requirements

All graduate students must satisfy the core course requirements in three out of four areas of chemistry through placement examination*s or appropriate courses*. The examinations are at the level expected for an ACS-certified B.S. degree. These examinations are given during the week prior to the beginning of the fall and spring semesters. *Students must take at least three exams upon entering the program*. Courses are selected from the following: CHEM 50133 Biochemistry, CHEM 50223 Organic Chemistry, CHEM 50282 and 50290 Physical Chemistry, and CHEM 50163 Inorganic Chemistry. A grade of "B" or better in the appropriate course is required to satisfy the requirement. *All graduate students must satisfy the core course requirements by the end of the third semester in residence*.

All graduate students are required to satisfactorily complete a course in laboratory safety.

The GRE must be taken by all entering graduate students. Normally, a student must submit the results of the exam to the Department of Chemistry before being admitted. In all cases, the examination must be taken before the end of the student's first semester residence in the program.

The time required for part-time students to meet requirements may be modified upon recommendation of a committee composed of the chair and two faculty advisers.

CHEMISTRY M.A. AND M.S. REQUIREMENTS

M. A. (Non-Thesis Option)

The M.A. in Chemistry (non-thesis option) requires a total of 36 approved hours, including at least 24 in chemistry with no more than six hours of credit in CHEM 50120, 50230, 60110, 60240, 60260, 60270 and 60280 combined. Each student is also required to pass an oral examination based upon the chosen program of study.

M. S. (Thesis Option)

The M.S. in Chemistry (thesis option) requires a total of at least 30 approved hours, including at least 15 in chemistry and six in thesis. Each student will defend his/her thesis in an oral examination.

The teaching experience is considered an important part of the graduate training program. Each student on a M.A. or M.S.-track is required to participate in a minimum of two, but usually no more than four, semesters of teaching.

CHEMISTRY PH.D. REQUIREMENTS

The Ph.D. in Chemistry comprises the following components:

1. *Lecture courses* to provide the student with extensive depth and breadth of knowledge in major areas of chemistry.
2. *A seminar program* designed to supplement the traditional course program with presentations given both by visiting scholars and TCU students and faculty. Graduate students are required to present one departmental seminar on a topic selected from the current literature but not related to their own research. This is normally given in the second semester,, and a second seminar describing the student's Ph.D. work is given in the last semester in residence.
3. *A research progress report* written and oral, to be presented to the student's supervisory committee by the end of the second year in residence. The written report must provide a summary of the research results obtained up to that point as well as a plan for the future direction of the student's research project. The research progress is evaluated on the pass/fail basis.
4. *A cumulative examination program* designed to inform the faculty of the student's knowledge and ability in the chosen field and to guide the student in his/her own development. These examinations are given four times per semester during the academic year in the areas of inorganic, organic, physical chemistry and biochemistry. In general, they are based on advanced coursework and/or the current chemical literature. A student is expected to begin taking cumulative examinations no later than the beginning of the third semester. Once the cumulative examinations are begun, the student is expected to pass two (2) during the first six (6) attempts, and must pass a total of four (4) within three semesters (12 attempts total). Part-time students should consult with their faculty adviser concerning time limitations associated with the cumulative examinations.
5. *An original research proposal* covering a feasible research plan within their area of interest but outside their current research efforts. This proposal should be at least five double-spaced pages, 12-point font, and not be longer than ten pages including references. The proposal is to be evaluated by a given student's supervisory committee on a pass/fail basis, defended in oral presentation before the supervisory committee, and should be completed by the beginning of the second regular semester following completion of the cumulative exams. Upon completion of the proposal defense, a student is formally admitted to candidacy for the Ph.D. degree. Admission to candidacy must occur at least one full semester before graduation.
6. *A teaching experience* that is considered an important part of the graduate training program. Each student is required to participate in four semesters of teaching, normally as an assistant in an undergraduate laboratory course. During these semesters the student enrolls in CHEM 50120.
7. *A dissertation* that is based upon the successful completion of an original research project. Each student defends the dissertation in an oral examination before the student's supervisory committee.

ADDITIONAL INFORMATION FOR NEW GRADUATE STUDENTS

In addition to the requirements detailed above (also listed in the graduate brochure), a graduate student must be aware of and comply with the following:

1) A new graduate student must choose a graduate advisor by October 1st if entering in the Fall semester, or by March 1st if entering in the Spring. The student must submit two ranked research director preferences (1st choice, 2nd choice) to the Graduate Studies Director. Choices will then be reviewed and approved by the faculty as a whole. (The form follows this section).

If a student wants to switch groups, she/he must notify the department chair and/or the director of graduate studies, as well as her/his own research advisor. Every effort will be made to resolve potential conflicts.

2) If a failing grade is received on the literature seminar requirement (second semester), a make-up seminar must be presented in the following semester (third semester). Failure at both seminars will relegate the student to the M.S. degree track.

All specific guidelines and schedule requirements provided by the seminar coordinator must be precisely followed or a failing grade for the seminar will be assigned. In addition, an electronic copy of the speaker's final PowerPoint file must be given within one week after the seminar to the seminar coordinator. These files will be archived by the chemistry department in a format that is accessible to students for future reference.

3) A copy of the original research proposal and of the research progress report must be provided (either as an email attachment or as a hardcopy) to the graduate advisor and to the Chemistry administrative assistant, to be placed in your departmental file. The research proposal must not be longer than 10 pages excluding references, in 12 pt, double-spaced format. It cannot be shorter than 5 pages. The research proposal must be outside the student's current research effort. The student must notify the director of graduate studies when any oral exam is scheduled, including the final dissertation defense.

4) Cumulative exams are normally begun in the second semester in residence. With permission of the Graduate Studies Director and his/her Research Director, a student may start taking the cumulative examinations in the first semester if she/he passed the entrance exam in her/his area. A student must start the cumulative examination process no later than the beginning of her/his third semester. A student is allowed to take any cumulative examination in any area (the student can choose the exam(s) on cumulative examination day by very briefly looking through the exam). No extra time will be given if the student has chosen to take two or more exams on the same day. If two copies of different exams are taken on the same day, this will count as two attempts in the total of 2 for 6 attempts or 4 for 12 attempts. The chemistry department will

maintain an archive of past cumulative exams in a format that is accessible to students for future reference.

Failure at the cumulative examinations requirement will result in an automatic M.S. track.

5) If the GRE was not provided during the application process, the student must provide a GRE score by the end of the first semester in residence.

6) Selection of the Supervisory Committee. A Supervisory Committee should be selected as early as possible in the second year of residence after consultation with the student's advisor, followed by the student contacting each prospective faculty member (as a faculty member may be unwilling or unable to serve on the Committee). This Committee is composed of the research advisor and typically two faculty members in the area of research, as well as one faculty member outside of the area of research. Students who have in effect two research advisors would then have only one more faculty member in their area of research, and still one outside their research area.

It is recommended to discuss the selection of the Supervisory Committee with your research advisor at the beginning of the second year in residence.

The Supervisory Committee will be the faculty evaluating all written and oral requirements (Research progress report, Original proposal, and Ph.D. dissertation). Changing the composition of the Committee AFTER the initial selection has been made is discouraged.

Student-Faculty Research Conferences

Student Name: _____

Faculty Member	*Signature*	Date
O. Annunziata		
J. L. Coffer		
S. V. Dzyuba		
K. Green		
B. Janesko		
D. E. Minter		
J.-L. Montchamp		
R. H. Neilson		
Y. Ryu		
Y. Sevryugina		
E. Simanek		

Faculty Advisor Selection

1st Choice	
2nd Choice	

(Return to Page Kimbrell upon completion)

GRADUATE STUDENT SEMINAR GUIDELINES

Objectives

The primary objectives of the student seminar program are to: (1) provide guidance and experience in selecting, organizing, and formally presenting technical information, and (2) supplement the graduate curriculum with discussions of important, current subjects that are not covered in the traditional courses.

Choice of Topics

Requirements. **The main content of the literature seminar must be based on the recent literature (i.e., articles published within the last 12 months). The topic cannot be related to any of your present or past research. The topic cannot be the one, which was presented at a TCU seminar within the last two years. It cannot be directly related to any courses that you are taking or to any seminars that you have given before at TCU or elsewhere.**

Other Considerations. Remember that you will be speaking to a mixed audience of organic, inorganic, physical, and biochemists. In selecting a topic, seek the advice of your research director and try to pick something of broad, general interest. Your introduction (which may be based on review articles, books, or other general sources) must explain the overall significance of your subject -- i.e., ***why is it important and interesting***? The content of your talk should be as multi-dimensional and varied as possible. For example, it might include information about the synthesis, structure, reaction mechanisms, applications, etc. of an interesting new class of compounds. One-dimensional presentations with slide after slide of similar reactions, structures, equations, etc. are easy to do but they become very tiresome to the listener and have little educational value.

Final Ph. D. Seminar. Of course, the topic of a student's final seminar is their dissertation research project. These seminars are viewed more like those given by visiting speakers, although the following guidelines should still be followed.

Presentation

An organized, professional style PowerPoint presentation is required. The individual slides must be carefully prepared and easily readable from the rear of the room (check it out!). Each slide should contain only one key piece of information or message to convey. Long tables of data and paragraphs of text are generally useless any only serve to irritate the audience. The speaker’s job is to inform the audience and teach us about your topic, not merely to read the slide to us.

Abstract

A brief, but informative, abstract (~ one page to 1.5 pages, double-spaced) of your talk with an accompanying list of references is required. The style of the abstract, including the format of the references, must follow standard ACS guidelines (consult the ACS Style Guide and formats used in recent ACS journals). ***References should be numbered in sequence and should refer to specific statements in the abstract.***

Preparation

Practice, practice, practice! Don't just sit and think about your talk or say it to yourself. Practice it out loud to yourself many times and at least twice (with the slides) to a small group, ***including your research director***. ***Do this at least a week in advance*** so that you will have time to incorporate their suggestions into your final presentation. Above all, ***make sure that your introduction and conclusion are very smooth*** since these are the parts to which most people will pay the closest attention. The complete seminar should be about ***45 - 50 minutes*** in length. A short presentation (of 30 min or less) indicates a lack of preparation and will result in a grade of "no credit" for the seminar. A good rule of thumb is an average of one slide per minute of presentation (i.e., for a 50 min presentation, a TOTAL of 50 slides). Practice for timing in front of an audience. Practicing by yourself often results in a false sense of timing.

Evaluation

The seminar will be graded on a pass / fail basis. The final grade is assigned by the seminar coordinator who will solicit written comments and numerical scores from the faculty in attendance (see attached score sheet). An informal "peer" evaluation by the graduate students in attendance will also be conducted after the seminar.

A passing score is 53 and above out of 70 points. Below 53 is fail.

Schedule

- At least ***three weeks*** before the seminar date, have your topic approved - first by your research advisor, and then by the seminar coordinator.
- At least ***two weeks*** before the seminar date, a typed draft of your abstract (including references) must be submitted to and approved by the seminar coordinator.
- At least ***one week*** before the seminar date, electronically submit your complete PowerPoint presentation (by e-mail or on disk) to the seminar coordinator for final approval.
- ***Two days*** before the seminar date, distribute the abstract (proofread it again!) to all faculty, students, and postdocs.
- Within **one week** after the seminar date, an electronic copy of the speaker's final PowerPoint file and abstract file must be given to the seminar coordinator. These

files will be archived by the chemistry department in a format that is accessible to students for future reference.

Failure to meet these deadlines will result in a failing grade for the seminar.

A failing grade on the literature seminar will result in the student having to present a different literature seminar in the semester following. If another failing grade is received during this make-up seminar, the student will be placed on a M.S. track.

Attendance

All graduate students enrolled (not just those scheduled to speak) are expected to attend all of the seminars including those given by TCU students as well as by visiting speakers. Two unapproved absences during the semester are grounds for a grade of No Credit. Also, all students are expected to actively participate in the question and answer period following the seminar. ***Students who are officially registered for the seminar course ARE REQUIRED to ask at least one meaningful question during the semester!***

A Graduate Student Seminar Award will be given to the Chemistry Graduate Student receiving the highest point total for her/his seminar during a given academic year (fall/spring). The award will consist of a certificate and a check for $50, and will be announced by the end of the spring semester.

CHEMISTRY SEMINAR EVALUATION FORM

Speaker _____ Date _____

	Poor (0-2 pts)	**Fair (3-5 pts)**	**Good (6-8 pts)**	**Excellent (9-10 pts)**
Choice of Topic				
Knowledge of Subject				
Organization of Presentation				
Style of Presentation				
Timing of Presentation				
Quality of Visual Aids				
Abstract				
		Total Points Pass ≥ 53/70 (~ 75 %)		

Additional Comments:

Signature (Faculty) _____ **PASS** _____ **FAIL** _____

RESEARCH PROGRESS REPORT

(by the end of the second year)

Objectives

To review the student's research progress on the thesis project. The student is expected to have made significant progress in the laboratory by the time of the oral examination. This requirement is intended more as an evaluation of progress than a stressful examination.

Written Report

A brief, but informative, abstract (~ one page to 1.5 pages, double-spaced) of your research work is required. The style of the abstract must follow that of a dissertation abstract.

The written report must provide a summary of the research results obtained up to that point as well as a plan for the future direction of the student's research project. The report (12-point double-spaced) itself must be no more than 10 pages in length (including figures, tables, and schemes, but excluding experimental section and references), and is evaluated based on the student's ability to carry out research as well as to put together a publishable manuscript. The report should contain at least one original idea for future work.

The report should include the following sections:

I. Introduction/Background & Significance/Specific Aims

II. Research Results

III. Future Directions

IV. References

V. Experimental Section

Presentation

An organized, professional style PowerPoint presentation is required. The presentation should be ~15 minutes in length (uninterrupted), followed by a question & answer session.

Evaluation

The progress report is graded on a pass/fail basis, using the following criteria:

- Has the student conducted a significant body of research?
- Has the student demonstrated a strong motivation and commitment toward obtaining a Ph.D.?

- Is the student receiving adequate supervision and guidance from her/his faculty advisor?
- Is the student's project substantive and sufficiently focused to be likely to result in a Ph.D.?
- Is the student demonstrating a proper command of the literature related to the research topic?
- Is the student demonstrating a level of intellectual and experimental independence?
- Is the student capable of organizing and presenting her/his result in a homogeneous manner and aware of what is required to reach the level of a publishable manuscript?

A failing grade on the research progress report will result in the student being placed on a M.S. track.

Miscellaneous

- Faculty who are not members of a given student's committee may attend at their discretion, but as observer only (non-voting and cannot ask questions).

- The written report and abstract must be provided to the student's thesis committee at least one week before the scheduled oral.

- A copy of the research progress report and PowerPoint presentation must be provided (either as an email attachment or as a hardcopy) to Page Kimbrell (Chemistry administrative assistant), to be placed in your departmental file, no later than one week following the oral presentation and after suggested corrections have been made.

ORIGINAL RESEARCH PROPOSAL

(by the beginning of the second regular semester following of the completion of the cumulative exams)

Objectives

To determine the ability of a Ph.D. candidate at identifying and investigating an original research problem. Upon completion of the proposal defense, a student is formally admitted to candidacy for the Ph.D. degree. Admission to candidacy must occur at least one full semester before graduation.

Written Report

The written original research proposal (12-point double-spaced) must be no less than 5 pages and no more than 10 pages in length (including figures, tables, schemes, but excluding references). The research proposal must be outside the student's current research effort.

The report should include the following sections:

I. Project Summary

II. Specific Aims

III. Background and Significance

IV. Research Design and Methods

V. References

Presentation

An organized, professional style PowerPoint presentation is required. The presentation should be ~15 minutes in length (uninterrupted), followed by a question & answer session.

Evaluation

The proposal is graded on a pass/fail basis, using the following guidelines:

- Are specific aims clearly stated?
- Is the research question of significance to the field of science?
- Is the literature background relevant and complete?
- Is the proposed research methodology relevant to meeting the goals of the project?
- Are the proposed experiments feasible and likely to lead to definitive results?
- Have reasonable alternative approaches been considered?
- Is the oral presentation well organized, clear, concise, and easy to follow?
- Does the written proposal clearly explain what is being proposed?

A failing grade on the research proposal will result in the student being placed on a M.S. track.

Miscellaneous

- Faculty who are not members of a given student's committee may attend at their discretion, but as observer only (non-voting and cannot ask questions).

- The original research proposal must be provided to the student's thesis committee at least one week before the scheduled oral.

- A copy of the original research proposal and PowerPoint presentation must be provided (either as an email attachment or as a hardcopy) to Page Kimbrell (Chemistry administrative assistant), to be placed in your departmental file, no later than one week following the oral presentation and after suggested corrections have been made.