2016-2017

Admission and Orientation

1.01 ADMISSION. Your admission as a degree applicant has been based on your previous college work, together with letters of recommendation and G.R.E. scores. In a few instances, students are admitted as "non-degree" candidates. This category is used when a student does not present all the credentials needed for admission to a degree program but can benefit from our graduate program. Non-degree students may become degree candidates when their credentials are complete and they demonstrate capability to do successful graduate work for one or more semesters.

1.02 ORIENTATION. There will be an orientation session for all new graduate students.

1.03 PLACEMENT EXAMINATIONS. A series of examinations that serve both as advisory (to indicate your level of accomplishments) and qualifying examinations (to satisfy degree requirements) will be given to all new graduate students at the time scheduled on the 2010 calendar. These examinations will be given in the areas of analytical, biochemistry, inorganic, organic, and physical chemistry. You are expected to select and take at least two examinations. Calculators are welcome. A non-qualifying score is not counted against you in any way but a good performance on any of these examinations will qualify you in that area and, thus, place you further along in your graduate studies. See Section 4.00 regarding this point.

1.04 GRADUATE ADVISER. Dr. Thomas A. Bryson, Director of Graduate Studies, will act as your adviser in conjunction with the Admissions Committee. After you choose a research director, he or she will advise you on your academic program and registration.

1.05 ADVISING AND COURSE ASSIGNMENT. After you complete the placement examinations, you will meet with the Director of Graduate Studies and the Graduate Admissions Committee to review preliminary registrations and a course of study designed to qualify you for the degree, and to prepare you for research. You are required to qualify in two areas of chemistry, accomplished either by scoring sufficiently high on the qualifying examination or by passing a "core course" with a B or better (see 4.03) in the area. You may sit in or audit courses in an area to review, supplement or develop new basic concepts if your background is deficient.

1.06 REGISTRATION. First year students and continuing students register via Computer Assisted Registration (VIP) that allows for early registration during the preceding semester for continuing students. First year students will carry three academic courses (9 credits) during the first semester and two academic courses (6 credits) during the second semester. After completing the first two semesters, you must register for one credit in each summer session and for six credits in each academic year session until you graduate. You must register in each session in which you are in residence including summer to receive a stipend. Registering for less than the recommended number of credits (or not registering at all) may result in loss or reduction of the departmental tuition supplement.

1.07 THE HONOR SYSTEM. We expect all of our graduate students not only to do their own work but also to report to the appropriate staff member any violations by others. Any graduate student guilty of a violation of these honor principles may be asked to leave. Honor, ethics and integrity are acutely important in the laboratory. Fraudulent data and any plagiarized material taken from the internet or other sources is likely to result in dismissal, retraction of publications and reexamination of degree(s) awarded.

From the University of South Carolina Honor Code: It is the responsibility of every student at the University of South Carolina to adhere steadfastly to truthfulness and to avoid dishonesty, fraud, or deceit of any type in connection with any academic program. Any student who violates this Honor Code or who knowingly assists another to violate this Honor Code shall be subject to discipline.

Please print this page, sign, date and turn in to the Graduate Office.

Facilities

2.01 FACILITIES. The Department of Chemistry and Biochemistry occupies the entire Graduate Science Research Center (GSRC). In addition, there are some chemistry laboratories and offices in the Physical Sciences Center (PSC), Sumwalt and Horizon I.

2.02 LIBRARY. The University's Library holdings are housed in the Thomas Cooper Library (opened June 1976), a seven-story library building that is a short walk from the Physical Sciences Building. The collection in the science, engineering, pharmacy and related fields is primarily located in the Science Library, which constitutes the entire Lower Level #4 of the Thomas Cooper Library. There are some additional holdings on the Mezzanine level of the Library. Regular library hours are: Monday - Thursday, 7:30 a.m. - 10:00 p.m.; Friday, 7:30 a.m. - 6:00 p.m.; Saturday, 10:00 a.m. - 6:00 p.m.; Sunday, 10:00 a.m. - 10:00 p.m. The Science Librarian is in charge of the science level (Level 4), which is staffed by three assistant science librarians and several student assistants, who are ready to help you at any time. There are over over three million volumes in the Thomas Cooper Library. They subscribe to about 30,000 journals either in print, online or both. The library also offers help in the form of research consultations and workshops, LibGuides, and the online Ask A Librarian service. For more information, go to library.sc.edu or call 777-4866. Also, the medical school library has a large number of volumes of special interest to biochemists. Medical school library hours are: Monday - Thursday, 8:00 a.m. - 10:00 p.m.; Friday, 8:00 a.m. - 6:00 p.m.; Saturday, 1:00 p.m. - 5:00 p.m.; Sunday, 1 p.m. - 6:00 p.m. Summer hours and hours during semester breaks are different.

The library is operated on an open stack system. Users are requested to carefully reshelve books and journals in their proper place. If a book or periodical's proper location is uncertain, there is a "to be reshelved" drop-off location near the librarian's office. Periodicals may not be taken from the library but copy machines are available to duplicate any necessary material that may be needed from the non-circulating collection. Graduate students may check out any of the circulating items that are not on reserve for periods of three weeks.

The Library maintains a computerized card catalog system, USCAN, that can be accessed through terminals in the Library or by any computer linked to Computer Services. You can also access the catalog online at www.sc.edu/libraries. In addition, there are computers for your use in the Reserve Room (ground or 5th level) of the Library. The user must supply their own disks.

2.03 SAFETY AND HOUSEKEEPING. The Department is quite proud of the fine research and teaching facilities available in the GSRC and urgently solicits your cooperation in their proper use and maintenance. Specifically, we ask that you observe the following general guidelines:

(a) Safety glasses are absolutely necessary whenever and wherever experimental work is conducted. Teaching Assistants must wear them when supervising undergraduate laboratories, and it is required that all students in their laboratory sections do so as well. Safety glasses are available in the Stockroom and in the University Bookstore.

(b) Contact lenses should not be worn by anyone working in the research or teaching laboratories due to the risk of increased injury from chemical splashes.

(c) As a safety precaution no one is permitted in the Departmental laboratories or stockrooms without proper shoes. Teaching Assistants are expected to enforce this policy in their undergraduate laboratory sections.

(d) Before you leave any experiment to operate unattended, please make sure that it does not constitute a possible fire or flood hazard. Specifically, if flammable solvents are involved it should be left in a closed hood. If this is not possible, check all joints to see that they are vapor tight. If running water is involved, make sure that all tubing is in good condition, that all connections are tight (preferably wired) and that all connecting troughs and/or sinks are free of any debris (corks, Kimwipes, etc.) which could clog the drain. We have had several floods and fires caused by failure to observe simple precautions.

(e) The Department is equipped with both explosion-proof and non-explosion proof refrigerators. The latter are clearly marked and are not to be used for the storage of any chemicals in open containers. In addition, food is not to be stored in any refrigerators that are used for the storage of chemicals.

(f) No one will be allowed to handle or work with radioactive isotopes or around potentially dangerous sources of radiation, e.g., X-ray, microwave, laser, until he or she has been thoroughly instructed by the faculty member in charge on the proper safety precautions and procedures to be followed.

(g) The faculty member in charge of a laboratory should be informed immediately of any safety hazards or accidents. The Department Safety Committee should also be informed of all accidents that occur. Any complaints regarding potential safety hazards and any safety suggestions will be treated seriously and greatly appreciated. Emergency telephone numbers are posted beside every hall telephone in the Department.

Emergency: 7-9111	Environmental Services: 7-2290	Health and Safety Services: 7-5269

For your own protection and to encourage safe work habits, the Safety Committee of the Department working in conjunction with the Safety Officer of the University will make periodic unannounced inspections of offices and labs. On joining a research group the first order of business is to study the group and/or departmental chemical hygiene and safety plan. The departmental plan is on the network in the public shared data folder. Each research group has a safety officer that can guide you to correct protocols.

UNAUTHORIZED EXPERIMENTS. Experiments not directly related to your course work or research problem must be approved in writing (with a copy to the Assistant Chair) by your laboratory instructor or research director. Students who conduct unauthorized experiments will be denied access to the laboratories of the Department, will be refused chemicals or supplies from the Department stockroom and teaching assistants will be replaced.

All incoming graduate students are required to attend a short course on "Chemical hygiene/OSHA training" scheduled during orientation.

2.04 STUDENT DESKS and CHAIRS. These items will be furnished to new graduate student assistants. After selection of a research director, you will move to that professor's research area. We are generally not able to assign desks in the building for new students who are not graduate assistants.

2.05 KEYS. Keys to the labs and offices are available from Sam Burgess in Room 113B, and will be issued as needed to graduate students.

2.06 MAIL. Students will have a mailbox in GSRC for University business only. Outgoing mail may be placed in the basket in the Department Office mail room. Pick-ups and deliveries are twice a day. Please do not have personal mail or packages delivered to the Department.

2.07 BULLETIN BOARD. The bulletin board in the student mailroom is reserved for notices of particular interest to graduate students. To avoid cluttering, we ask that all notices on this board be posted by the Graduate Office. Please check this bulletin board frequently.

Financial Support

3.01 FEES. Most graduate students in the Department receive a stipend from funds administered by the University. This support may be in the form of teaching assistantships, research assistantships, fellowships, or scholarships. Students pay any fees other than academic (e.g. health services). To receive the tuition supplement (tuition is paid for out of departmental or grant funds), you must register for a course load of nine semester hours for the first academic year semester and for six credits for each academic year semester thereafter. You must also register for one hour in each Summer I and II session. Any additional fees must be paid at the time of registration but they can be payroll deducted. Student activity cards for admission to athletic events can be purchased at registration. You must participate in the group medical insurance plan unless you have equal or better coverage. The student health center reviews alternate coverage and awards waivers to those who can prove they have comparable or better coverage. The cost of health insurance and health center access is projected to be ~$1000 per year after college and university supplements. Injuries arising during official duties are covered by workmen's compensation. Graduate assistants are paid semimonthly by check. Federal and state income taxes will be deducted from these checks. The University requires direct deposit of your paycheck to your financial institution.

3.02 TEACHING ASSISTANTSHIPS. A teaching assistantship provides training in the fundamentals of chemistry and experience in leading a class of students. The experience is especially valuable for students who will eventually seek academic appointments. Teaching assistants normally devote 4 to 8 contact hours (about 14-18 total hours) per week toward the supervision and operation of our undergraduate laboratory and/or recitation sections. A portion of the teaching assistant assignment in most courses is to assist in grading hour quizzes, final exams and homework, as may be required by the staff member in charge. In addition, as a T.A. you may be required to attend briefing sessions and, for the initial assisting in a course, may be required to attend the lectures in the course. You should bear in mind that attendance at these briefing sessions and course lectures is an essential part of your duties. *Teaching assistants who fail to satisfactorily fulfill the responsibilities assigned them may have their appointments revoked*.

During a semester, illness or other conflicts may require a substitute for your teaching assignment. It is your responsibility to see that your assignment is met. Often you can arrange with other T.A.s with similar assignments to trade sections to remedy a short term conflict. Please be aware that if the Department has to pay someone to replace you, then your stipend will be reduced by that amount.

The teaching assistantship serves a second purpose, providing financial support for students to pursuing their research. *Unsatisfactory progress on research may result in the cancellation of the teaching assistantship*.

3.03 JOSEPH W. BOUKNIGHT GRADUATE TEACHING AWARDS. Since 1973, the Department is fortunate in being able to recognize outstanding teaching on the part of graduate assistants through these Graduate Teaching Awards, named in honor of Professor Emeritus

Joseph Ward Bouknight.   There are 6 awards given for the spring and fall semesters in the amount of $250 each.

3.04 DISTINGUISHED TEACHING ASSISTANTSHIPS. The Department has established up to three nine-month distinguished teaching assistantships with a stipend of $1000 per academic year above the level of a regular teaching or research assistantship. These appointments will be awarded to graduate students who have (1) completed at least one year of graduate study in chemistry at USC, and (2) demonstrated exceptional teaching abilities in teaching assignments in prior years. The duties of Distinguished Teaching Assistants will generally be the same as those of teaching assistants, but they might be called upon to assume more responsibility for laboratory organization and limited supervision of other teaching assistants involved in multi-section undergraduate courses. In any case, duties of Distinguished Teaching Assistants will require no more time than those of other teaching assistants. Distinguished Teaching Assistants will be assigned only to lab and recitation sections in courses above the freshman level.

Distinguished Teaching Assistantships will be awarded by the Assistant Department Chairman who will base his decisions on the same information used to select J. W. Bouknight teaching awards. Appointment of an individual will normally be limited to no more than four consecutive semesters.

3.05 RESEARCH ASSISTANTSHIPS. Research assistantships are awarded on the basis of good academic standing, experience and interest in the research problems for which assistantship funds are available. The stipends are comparable to those of teaching assistantships. Research Assistantships are awarded on the recommendation of the individual faculty member responsible for the funds involved. The duties and hours are those set by the supervising faculty member.

3.06 FELLOWSHIPS, SCHOLARSHIPS AND OTHER SUPPORT. Fellowships and scholarships are sometimes available from industrial, government, and private sources. These may be allocated by the Department, they may be awarded competitively on an inter-departmental basis by the University or they may be national. The Department will attempt to inform you of all such support available and will be glad to assist qualified persons in applying. In this connection, beginning graduate students would be well advised to take the Graduate Record Examination, if they have not already done so. The awards of fellowships or scholarships are frequently based in part on the GRE scores of competing nominees. Students have been appointed for twelve month terms and may expect support for both summer sessions as long as their work is satisfactory.

Circumstances may dictate additional course work and/or timetable alterations in the program of study for students with special fellowships or for part-time students. The Graduate Director, in consultation with the students' advisor and committee, may alter deadlines to suit these circumstances. Changes in other basic requirements or relief from specific regulations are addressed through petitions to the faculty by way of the Candidacy and Petitions Committee.

3.07 CONTINUING APPOINTMENTS. After an assistantship or fellowship has been awarded, you may normally expect continued support during the period of your graduate study.

This support is contingent upon satisfactory performance of the duties of the assistantship, normal progress towards a degree, and satisfactory academic performance.

After the first semester. If the Departmental Grade Point Ratio (section 4.02) is below 2.66 for three chemistry courses (DGPR, see Section 4.02) at the end of your first semester, you will not be supported the following semester. If two chemistry courses are completed in the first semester the minimum DGPR for continued support is 3.0.

After two semesters. A DGPR of 3.00 is required for continuance in a degree program and for continued support after two semesters. The 3.00 DGPR regulation is in effect even if petitions allow postponement of course work beyond the second semester.

We do not support students in the M.A.T. or I.M.A. degree program.

3.08 LIMIT ON SUPPORT. No graduate student will be supported on teaching or research assistantships longer than five years for a Ph.D. degree. Candidates for the M.S. degree will not be supported after the first semester of the third year of attendance (2 years and one semester).Students who have not been admitted to Ph.D. candidacy by the end of the first semester of their third year will not be supported.

3.09 OUTSIDE WORK. You are expected to devote full time to your assistantship duties and graduate studies; therefore, outside employment is not permitted. Assistants may accept fees for tutoring undergraduate students. However, no graduate assistant may accept a fee from any student during a semester when he or she has any responsibility for that student's grade in a course or laboratory.

3.10 WORK DURING UNIVERSITY RECESSES. Teaching duties normally begin with the general meeting of teaching assistants at the start of each term and end when laboratories have been checked out, the final examination in the course to which they are assigned has been graded, and the student has been released by his or her faculty supervisor. Students being paid entirely or in part from grants to individual faculty members must workout schedules with their research director.

Regulations and Degree Requirements

4.01 GRADES. With the exception of thesis and dissertation courses, letter grades are awarded for courses; A, B+, B, C+, and C are passing grades, while D+, D and F are not passing grades in the Graduate School. Graduate credit may be earned with a grade of C, but a graduate degree cannot be awarded unless the student has an overall average of B and a B average on all 700- and 800-level courses. According to the Graduate School regulations, grades below B in as many as twelve semester hours of work will disqualify a student for a graduate degree. (Note that A = 4.00, B+ = 3.50, B = 3.00, C+ = 2.50, etc.) (Section 3.07)

4.02 DEPARTMENTAL GRADE POINT RATIO. The Department finds it convenient to compute a Departmental Grade Point Ratio (DGPR) to aid in the evaluation of your performance. This differs from the official University Grade Point Ratio in that the DGPR includes all graduate courses that you are required by the Department to take, both within or outside the Department, but does not include grades on research, thesis, seminar and dissertation (701, 790, 79l, 898, 899).

4.03 QUALIFYING FOR THE PH.D. AND/OR M.S. DEGREES. A candidate for the M.S. or Ph.D. degree must qualify in two areas including his or her major. Paths to Qualification in an area include:

1. A satisfactory score on the placement/qualifying examination given upon entrance – or –

2. A grade of B or better in one of the area graduate courses.

Entering students must attempt at least two qualifying exams to be permitted to register for classes and to be assigned a T.A. position. A student who does not qualify by the end of their second semester of the first year will be terminated.

4.04 CORE COURSES. The 700 level "core" courses are the courses that each division requires its students to take. A Ph.D. candidate must take all "core" courses in their major[1]. A list of graduate courses offered by the department with brief course descriptions can be found in Section 11.00.

Area	**Core Courses**	**Specialty Courses**
Analytical Chemistry	722, 723	729
Biochemistry	751, 753	752, 759
Inorganic Chemistry	711, 712, 713	719
Organic Chemistry	735, 736	739 (633)
Physical Chemistry[2]	742, 743, 744, 747	745, 749

[1]In the event that a core course is not offered in a student's first year, the division will identify an appropriate substitute.

[2]Physical majors are required to take three physical chemistry core courses offered in their first two semesters.

4.05 COURSE REQUIREMENTS. A student in the Ph.D. program must pass at least five 700-level courses in the Department of Chemistry and Biochemistry during the first two semesters including at least three in your area and one or two in an area or areas outside your major. The Department may adjust course requirements for a student entering with prior graduate course work. With the approval of your Advisory Committee (4.07), you may (a) take one specified 600- or 700-level course outside of the Department of Chemistry and Biochemistry from a list of preapproved courses maintained by the Admissions/Petitions Committee in place of one of the 700-level chemistry/biochemistry courses outside the student's primary area or (b) petition the

Admissions/Petitions Committee of the Department for permission to substitute a course not on the preapproved list. The petition must be approved by the Admissions/Petitions Committee before registration for the course. The grade received in any course so substituted will be included in the computation of the DGPR. At the discretion of the Admissions/Petitions Committee and within the limitations prescribed by the Graduate School, courses taken at another University may be accepted to satisfy these requirements.

A candidate for the M.S. degree must pass at least three 700–level courses in chemistry/biochemistry of which at least one must be in your major field and at least one in an area outside the major. Courses numbered 790, 791, 898, or 899 may not be used to meet these requirements. Not more than 12 of these hours may be in courses in the 500 or 600 level. Your Advisory Committee (4.07) may require other courses.

4.06 RESEARCH/CHOICE OF ADVISOR. The Ph.D. and the M.S. degrees are research oriented degrees. Consistent with this concept is the fact that all other aspects of graduate work (courses, seminars, etc.) are geared towards research. To begin research, it is necessary to have approval and cooperation of a Research Advisor. Beginning students should become familiar with the research in the Department and are required to discuss research programs with at least three faculty in the students' area of interest (analytical, biochemical, inorganic, organic, or physical). Faculty areas of research are detailed in section 10.02. Students are not restricted to one area and are encouraged to interview more than 3 faculty. The Faculty Research Seminar Series in late August/early September, which is required of first year graduate students, will be of great help in learning about faculty research programs. Minimum interviewing must be completed by October 1st (March 1st, January entry) as evidenced by the interview form (section 10.03) turned into the Graduate Office. You are required to clear this choice with the Director of Graduate Studies on or after COMMITMENT DAY by turning in Form 10.04 to the graduate office. For Fall entry, Commitment Day is October 1; January entry, Commitment Day is March 1st. You must choose a research director by November 15th for Fall entry; May 1st, January entry. After selection of a research problem, you should concentrate on research throughout the rest of your graduate program. This should be your greatest challenge and the focus of the major portion of your energy. Please note that to maintain graduate student support and for continuance in the program, you must have a research advisor and show progress toward the advanced degree.

4.07 RESEARCH ADVISOR AND ADVISORY COMMITTEE. The faculty member who agrees to become your Research Advisor also becomes chairman of your Ph.D.-Advisory Committee (see the committee form in section 10.00) for all actions except the PLAN, PROPOSAL and DISSERTATION defense. Your committee will be selected by you, in consultation with your research advisor, and with the approval of the faculty members involved by the end of May (Dec for January entry). The Graduate Director reviews the committee selection and requests the Graduate School appoint the committee (via G-DCA form). The research director will, in consultation with the student, choose the make-up of their research plan/proposal committee to best match the student's research project. The Advisory Committee is charged with the responsibility of determining and monitoring your course program and your general progress throughout the remainder of your studies at USC. The Advisory committee consists of at least four members: (i) the research advisor (ii) two other faculty members in the

Department of Chemistry and Biochemistry (one in and one outside student's area) (iii) a faculty member outside the Department. Your overall program should be reviewed by the committee during or before the Research Plan (M.S. and Ph.D.) and Proposal (Ph.D.) oral examinations and a finalized Ph.D./M.S. program completed (sections 10.08 and 10.09) and submitted to the Director of Graduate Studies. The faculty member in your major area serves as chairman for the Research Plan, Proposal and Dissertation Defense examinations. Your advisor(s) serves as a faculty member in your major area for the Plan. At the discretion of the advisor, a committee meeting may be called in the 3rd and 4th year to review progress (see section 4.13). The Ph.D. Advisory Committee must meet and review progress toward the Ph.D. in the 5th year; committee input is required for any petitions to consider extension of support beyond the 5th year. Following the Research Plan, a M.S. degree candidate's committee will be narrowed to consist of the advisor and a faculty member in the student's major area.

<u>Switching research advisor</u>. You must have a research advisor and show progress towards a degree. If at anytime an adviser chooses to abate their sponsorship of a student, the student will be given two weeks to select a new advisor before the Department terminates support and degree status.

The changing of research directors is a very serious action. Recognizing that this occasionally occurs, strict protocols for changing groups have been developed to protect the interests of faculty and students. If you are contemplating a change, you should see the Director of Graduate Studies immediately. Improper conduct can endanger degree status.

4.08 DEGREE STATUS AT END OF YEAR ONE. At the end of the second semester of the first academic year, each beginning graduate student's work (courses and qualifying) will be evaluated. If you have a DGPR (4.02) of 3.0 or greater, are qualified in two areas (4.03) and have joined a research group you are authorized to continue work towards an advanced degree. If not, you will be required to discontinue work toward an advanced degree.

4.09 CHEM 790 and 791 All graduate students, MS or PhD candidates should take Chem 790 (Introduction to Research) for credit during the third semester and Chem 791 (Introduction to Research) for credit during the fourth semester. The grade submitted for these courses is assigned by your advisor based on research progress.

4.10 Student Research Plans, Oral Comprehensive Examinations. In your 3rd semester, you must submit a copy of the final description of RESEARCH PROGRESS AND PLANS to the Director of Graduate Studies (i.e., the Graduate Office) and each of your committee members together with a date, time and place (approved by your committee) for the oral presentation of the plan to your Advisory Committee (see next paragraph for scheduling). Use the "Plan" title page in the back of this handbook (section 10.05) as the cover page of the Plan. Your advisor must sign the title page before it will be accepted by the Director of Graduate Studies. The PLAN shall serve as the ORAL COMPREHENSIVE EXAMINATION for the Ph.D. degree (i.e., this examination also satisfies the Graduate School requirement for a Comprehensive Examination of Candidates for the M.S.). Thus, your full advisory committee (4.07) (or substitute members) must be present for the defense. The committee will question you on the (a) specific knowledge of the research project, (b) general knowledge of the research field and (c) research progress to date.

Scheduling of the Plan: If the Plan semester occurs in the Fall, the Plan must be defended during October. If it occurs in the Spring, the Plan must be defended between February 16 and March 15. An earlier defense of the Plan is also possible. At least three weeks before the start of the month-long defense period, you should schedule the date and time of the plan defense with the committee members and notify the Director of Graduate Studies (i.e., the Graduate Office) of the defense date and time. The final Plan will be turned in to the Director of Graduate Studies (i.e., the Graduate Office) and the Advisory Committee one week prior to the defense date.

You should consult your research advisor for overall content, emphasis and scope of the Plan. The written report should be more substantial than an outline and should employ standard ACS format for both the experimental section and references. The emphasis will be on what the proposed research will tell us about the nature of the physical universe, an understanding of the various techniques to be employed in attacking the problem, as well as research progress. The written Plan will include: (i) an overview of the area to be studied, a discussion of your own research accomplishments to date, key references, plans for future research (limit of ten double spaced pages including references) and (ii) a detailed experimental section (no page limitation). You will present an oral summary of your research plans and progress to date to the Advisory Committee. The oral examination of (a) specific knowledge of the research project, (b) general knowledge of the research field and (c) research progress to date will follow your oral presentation. The questions of general knowledge of your research field will be based on material of the type presented in the graduate core courses of the major.

The committee will separately vote (pass or fail) on each of the three components of the written plan and its oral defense: (a) knowledge of the research plan, (b) general knowledge of the research field and (c) research progress to date. Passing requires a favorable three fourths vote of the committee in each case. Successful passing of all three components is required for you to move forward in the Ph.D. track. Passing only two of the three components of the Research Plan leads to a postponement of the Research Proposal (4.11) to early in your fifth semester and to a re-defense of the part of the Research Plan not passed. The re-defense must take place during your fourth semester (either February 16 – March 15 or October). If you pass less than two of the three components of the original defense of the Research Plan <u>or</u> do not pass the repeated component in the re-defense of the Research Plan, you will be placed in the terminal M.S. degree category or, in extreme cases, terminated.

The committee may also require you to take additional or remedial course work. You must provide a copy of the approved research plan to the graduate office to be placed in your departmental file.

<u>Issues pertaining to the Research Proposal voted on by the Committee after the Plan is successfully passed:</u>

After voting for a Full Pass of the Research Plan, the committee will next consider issues of the timing, scope and research advisor involvement in the Research Proposal (4.11). In each case, your research advisor will make a recommendation to the committee, which will then discuss and vote on the recommendation. These committee decisions should be duly noted on the cover page of the Plan (10.05).

1. Timing of the Proposal

Should you submit and defend the research proposal in your fourth or fifth semester?

2. Scope of the Proposal

The graduate handbook (4.11) defines the research proposal as "involving roughly three elements: (1) experimental or theoretical techniques, (2) classes of compounds to be studied, and (3) chemical or physical properties to be determined." In addition, "no two of the three elements should be the same or even very similar to those employed or studied by the student in the course of the dissertation research or by others in the research group. At least one of the elements should be new or original."

Should you write a research proposal in which two of the three above elements are different from your own research – or in which one of the three elements is different. Note: The expectation that one of the elements should be new or original would not change.

3 . Involvement of the Research Advisor in the Proposal

Should your research advisor be significantly, minimally or not involved in developing the original idea into the submitted proposal?

4.11 PRE-PROPOSAL MEETING, RESEARCH PROPOSAL, AND RESEARCH PROGRESS UPDATE. The Department of Chemistry and Biochemistry uses the research proposal to fulfill the Graduate School's requirement of a written comprehensive examination for the Ph.D. degree. The proposal is due in the 4th or 5th semester (see end of section 4.09) and the submission of this requirement must be preceded by a PRE-PROPOSAL meeting (see below).

Proposal: In your 4th or 5th semester (see end of section 4.09), you must submit to the Director of Graduate Studies (i.e., the Graduate Office) and the Advisory Committee copies of a final research proposal, together with a date, time and place for the oral defense. It is your responsibility to arrange with the members of your PROPOSAL committee the time and place of the examination (see below) and to ensure that an email announcement of the examination is distributed to the Chemistry and Biochemistry faculty. Use the "Proposal" title page in the back of this handbook (section 10.06) as the cover page of the PROPOSAL. The PROPOSAL serves as the WRITTEN COMPREHENSIVE EXAMINATION which is a requirement of the Graduate School. Thus, your full advisory committee (4.07) (or substitute members) must be present for the defense.

Scheduling: A fourth semester Spring proposal must be defended between March 16 and April 15 and for January entering students defended in October. A fifth semester defense must take place before the end of September (or before February 15th for January entering students). An earlier defense of the Proposal is also possible. At least six weeks before the start of the month-long defense period, you should schedule the date and time of the proposal defense with the committee members and notify the Director of Graduate Studies (i.e., the Graduate Office) of the defense date and time. This will allow adequate time for a pre-proposal meeting (see below). The final proposal will be turned in to the Director of Graduate Studies (i.e., the Graduate Office) and the Advisory Committee one week prior to the defense date.

Pre-Proposal Meeting: Your Advisory Committee is asked to advise you on the suitability of your choice of a topic for the research proposition. As soon as you have a good idea of what your proposal plan will be, your Advisory Committee should be apprised of the project. The Advisory Committee will meet (PRE-PROPOSAL MEETING) for a short period of time while you briefly outline the proposal project. Because the pre-proposal meeting is an unofficial meeting of the committee, attendance by the outside of the department member is optional. Extended presentations or handouts are not advisable at this time. Each committee member is expected to recommend to either "proceed" or "look for a new topic" to the committee chairman. A recommendation to look for a new research proposal topic should in no way be construed as a failure and this recommendation carries no penalty. At the same time, you should be aware that advice to proceed with the proposed topic is no assurance that the exam will be passed or even that committee members consider the proposal to possess sufficient originality to merit a pass on the oral exam itself should the topic be competently developed and presented. Advice to proceed at this point simply means that there are no obvious conflicts with the proposal guidelines. If, at a later time, you find it necessary or desirable to change the thrust of the proposal, no new meetings or outlines are required unless you desire a recommendation from your committee on the change. However, you should be aware that the advice to proceed was based on the original outline. At this pre-proposal meeting, the advisor or committee may require a write-up of post-PLAN experimental progress that comes due at the proposal defense.

The Research Proposal defense should begin with a brief review of post-RESEARCH PLAN research progress consisting of 4-6 figures, tables, etc. The summary of research progress will be an oral report unless otherwise indicated at the pre-proposal meeting (above). The defense is open to other interested faculty members. A pass shall constitute a favorable vote of at least 75% of the PROPOSAL committee. Should you fail the initial oral proposal, you must present a second research proposition within 90 days of your first presentation. This proposal must be an entirely new idea unless otherwise specified by the Advisory Committee. Should you fail this second examination, you are permanently disqualified for the Ph.D. degree. **If you fail the defense of the Research Proposal you will be placed in the terminal M.S. degree category or, in extreme cases, consigned to non-degree status**. As noted in section 4.09, the Research Plan-Oral Comprehensive Exam satisfies the Graduate School requirement for a Comprehensive Examination of Candidates for the M.S. In either proposal, the committee can delay a final decision on pass or fail and make specific recommendations that you must fulfill to the satisfaction of the committee within 20 days. (If the action of the committee at the end of this period is to fail for the first proposal attempt, you have 70 days to present the new proposal.)

The research proposal tests your ability to conceive and to critically evaluate a significant research question, to relate the questions to previous work, and to develop a practical plan designed to obtain information upon which an answer to the question may be based. The proposal also tests your ability to organize, present and defend your conception under the give-and-take of a seminar situation. The research proposal maybe thought of as consisting of (1) the conception of an idea, (2) the development of the idea and the written expression of the plan of the proposal, and (3) the oral defense of the idea. It should be understood that the oral defense of the idea is considered the most important part of these three.

Proposals should consist of an analysis in depth, including background material of a significant but previously uninvestigated or incompletely investigated chemical question along with a detailed plan for its investigation. The scope of the proposal should be roughly between that of an M.S. Thesis and a Ph.D. Dissertation. To aid you as you prepare your oral research propositions, the following guidelines have been established by the Department of Chemistry and Biochemistry. The proposal can be thought of as involving roughly three elements: (1) experimental or theoretical techniques, (2) classes of compounds to be studied, and (3) chemical or physical properties to be determined. The student might wish to consider a fourth element: why is the proposed research important to science? Unless recommended otherwise by your committee after the Research Plan (see end of section 4.09), no two of the three elements should be the same or even very similar to those employed or studied by the student in the course of his dissertation research or by others in his or her research group. At least one of the elements should be new or original. The level of involvement of your research advisor will also have been determined during the discussion following the Research Plan (see end of section 4.09).

The written proposal should not be excessively long. As a rough guide, it is recommended that the proposal have 2-4 typewritten pages of background material, 4-6 pages detailing the actual proposal and approximately one page of references. The ACS guide for authors should be consulted for abbreviations, standard footnotes and reference format, etc.

Participation in an oral research proposal is open to all faculty, but the PROPOSAL Committee makes the final judgment as to its acceptance. When the proposal is passed, you are eligible for admission to Ph.D. candidacy (4.12) once the research advisor verifies that research is progressing well.

4.12 ADMISSION TO DEGREE CANDIDACY. Upon successful completion of the research proposal (section 4.11) the Department will consider admission to Ph.D. degree candidacy. This decision is based upon your research and academic progress and a recommendation from your research advisor. Students who have not demonstrated ability to pursue a research program may be left in provisional Ph.D. degree candidacy. The Graduate School requires a grade point ratio of 3.0 or better for admission to candidacy for the M.S. or Ph.D. degrees. Ph.D. degree seeking students should register for CHEM 899 (at least 12 credits of CHEM 899, but not more than 30, must have been taken by the time of Graduation). M.S. students should register for CHEM 898. If you have not been admitted to Ph.D. degree candidacy by the end of the 5th semester (excluding summer sessions), you will be placed in the M.S. degree program and the 2-year 1-semester support limitation (section 3.08) applies. A petition to the Petitions Committee is then required for nomination to Ph.D. candidacy.

<u>Admission to Ph.D. degree candidacy.</u> In summary, admission to Ph.D. candidacy results from successful completion of (a) the Research Plan (4.09), (b) the Research Proposal (4.11) and (c) a

short recommendation from your advisor indicating that research is progressing well. A Doctoral Program of Study (DPOS) must also be prepared and submitted to the Graduate School as part of this process.

Admission to M.S. degree candidacy. For a student pursuing a Master's degree, the M.S. candidacy recommendation can be considered after passing the research plan at the M.S. level (section 4.09). As with Ph.D. candidacy, this decision is based upon your research and academic progress and a recommendation from your research advisor. A Masters Program of Study (MPOS) must also be prepared and submitted to the Graduate School as part of this process.

4.13 ANNUAL COMMITTEE MEETING OF THE STUDENT AND THE ADVISORY COMMITTEE

Fourth Year. During the first month of your fourth year, the Graduate Director will contact each student and their advisor and ask them whether research is proceeding well for graduation in less than five years. If either you or your advisor indicates that there are any problems or that either wish to have a committee meeting, a meeting will be scheduled by the student to discuss the problems.

Fifth year. By the end of the second month of your fifth year (i.e., October 15 or March 1), in consultation with your research advisor, you will produce a thesis outline and an approximate (target) defense date. This information will be submitted to the chair of your advisory committee by the indicated date. The committee chair will examine the thesis outline and target defense date. If problems are identified or if either you or your advisor wishes to have an advisory committee meeting, you will schedule a meeting to discuss the problems. The chair of the committee will report the result of the process to the Graduate Director.

4.14 GRADUATE STUDENT SEMINARS. You are required to participate in Graduate Student Seminars, which are handled at the divisional level. Participation is defined as attendance and discussion as well as presentation.

1. First Seminar. You will register for and present one seminar before the end of your second year. You are encouraged to present your first seminar in your first year.

2. Second Seminar. For Ph.D. candidates, a second seminar is to be presented before the end of your third year.

Grades for student seminars will be assigned by the divisional faculty seminar chairman who will also review your performance with you after your talk. Students who present seminars are required to furnish all faculty and graduate students with an outline well before the date of the presentations. The Faculty Chairman of the divisional seminar should be consulted on selection of a topic and form for the outline.

3. Ph.D. Defense Seminar. In addition, each Ph.D. candidate will present a public seminar describing his or her dissertation research immediately before the defense of the dissertation with

the examining committee present. The abstract announcing it should be submitted electronically to the Graduate Office at least a week in advance.

Faculty Research Seminars. All first year graduate students entering in the Fall are required to attend the Faculty Research Seminar Series. In these seminars, general regulations and policies of the department and the Graduate School will be discussed and the members of the faculty will review their areas of research. Attendance is compulsory.

4.15 SEMINARS WITH INVITED SPEAKERS. On a regular and frequent basis seminars are given by invited speakers who represent research efforts in all fields of chemistry and biochemistry. The University of South Carolina has been fortunate in having many of the world's leading chemists and biochemists present seminars here over the last few years. You are expected to regularly attend these seminars for the overall program constitutes an effective means for exposure to work and people outside of, as well as inside of, your immediate research area.

4.16 FOREIGN LANGUAGES. There are no specific language requirements for the M.S. and Ph.D. degrees. The Department of Foreign Language offers intensive reading courses that may be helpful for your research program.

4.17 M.S. THESIS AND PH.D. DISSERTATIONS. Candidates for the M.S. degree must present a thesis that embodies the results and interpretation of original research. Both your Research Advisor and the Second Reader must approve the thesis. The Second Reader is customarily a faculty member in the same area selected by you or your advisor.

The heart of the Ph.D. degree is the dissertation, which is the culmination of an original investigation resulting in a real contribution of knowledge.

The Graduate School office (Byrnes International Center) can furnish information concerning requirements of format, style, etc. Information can be found at www.gradschool.sc.edu.

4.18 DEFENSE OF DISSERTATION. After the dissertation has been completed and approved by the Research Advisor, as a candidate for the Ph.D., you will present a dissertation seminar to the faculty and defend your dissertation by an oral examination before your Examination Committee (which has the same composition as the Advisory Committee, section 4.07) and any interested faculty members. This defense is a final opportunity to demonstrate to the faculty that you have developed into a mature scientist worthy of respect and commendation.

No oral examination is required for the M.S. degree.

4.19 FINAL REQUIREMENTS AND FEES. Steps toward the M.S. and Ph.D. degrees are outlined in sections 6.00 and 7.00. Deadlines shown in these tables should be noted and the master schedule should be consulted for specific dates. The advisor(s) pays for their bound copy. The chemistry department pays for the bound copy that becomes a part of the chair’s library.

4.20 PETITION AND APPEAL PROCEDURE. The Department's Admissions Committee functions as the Petitions Committee (Candidacy, Examination and Petitions Committee) for graduate student appeals or requests of temporary relief from a departmental academic regulation. Issues between the graduate student and advisor(s) are mediated by the Director of Graduate Studies but may be referred to the Petitions Committee for final resolution.

PROCEDURE: A written appeal or petition with appropriate supportive materials is submitted to the petitions committee *via* the Director of Graduate Studies, the Graduate Administrative Assistant or any committee member. The committee considers issues with input from the Director of Graduate Studies for students that do not have an advisor, the student's advisor, the student's Advisory Committee and other relevant sources. The committee makes a judgment which is communicated to the student, the student's advisor and appropriate departmental personnel. Judgments are presented in the agenda of the next departmental meeting and may be discussed or modified. Reviewed judgments are put into action by the Department. Judgments are normally accepted by the faculty but the petition committee's decision can be appealed directly to the faculty at a regular faculty meeting.

Petitions pertaining to course requirements must be submitted prior to registration for the course in question.

If a student loses support (section 3.07) or is disqualified from a degree program, the Petitions Committee considers a change of status having remedied the disqualifying factor(s).

Procedures for appeals and petitions relative to Graduate School regulations appear in the Graduate Studies Bulletin under Academic Regulations.

Master of Arts in Teaching and Interdisciplinary Master of Arts

5.01 DEGREES. The MAT and IMA degrees in Chemistry are co-sponsored by the College of Education and the Department of Chemistry and Biochemistry. Admission and degree requirements are quite different from those of the M.S. and Ph.D. programs. Interested students are advised to seek detailed information from the MAT-IMA office located at the Graduate School.

5.02 PURPOSE. The MAT degree in Chemistry is designed for graduates of liberal arts programs who desire to meet requirements for teacher certification and carry on graduate studies to teach chemistry. Students who are certified or certifiable as teachers are not eligible for the MAT program but may enter the IMA program which has the same purpose.

5.03 ADMISSION. Students who wish to enter the MAT or IMA degree programs are required to possess a baccalaureate degree and attain an acceptable score on either the Graduate Record Examination or the National Teachers Examination and be acceptable both to the College of Education and the Department of Chemistry and Biochemistry.

5.04 FOREIGN LANGUAGE. There is no foreign language requirement for either degree.

5.05 THESIS. There is no thesis requirement, although students may exercise an option to write a thesis that may be substituted for six credit hours of course work.

5.06 COURSE WORK. A minimum of thirty graduate credit hours is required for the MAT degree distributed between the College of Education (six to fifteen credit hours), and the Department of Chemistry and Biochemistry(fifteen to twenty-four credit hours). The IMA degree requires thirty-three hours, nine to twelve in the College of Education and twenty-one to twenty-four in the Department of Chemistry and Biochemistry. The distribution or course selection is made individually in consultation with the student's Advisory Committee, but at least one half of these credit hours must be obtained with courses numbered 700 or higher. The following courses have been designed specifically for these programs: Chemistry 700, 702, 703, 704, 705 and 706.

5.07 ADVISORY COMMITTEE. Each student is assigned an Advisory Committee consisting of three members from the College of Education and the Department of Chemistry and Biochemistry. It is the committee's responsibility to advise and consult with the student and follow his or her progress. The committee also makes the final degree granting recommendation to the Graduate School.

Section 6.00 Check Point for the Master of Science Degree in Chemistry

	Steps	Timing	Responsibility
1.	Completion of placement/ qualifying examinations	Immediately prior to first registration	Student (administered by the Department)
2.	Advisement (by appointment) to plan course of study	During registration period, lst semester	Student and Director of Graduate Studies
3.	Completion of Interviewing	October 1 (March 1) of the first semester.	Student
4.	Choice of Research Advisor	After Oct. 1 (Mar. 1) but by Nov. 15 (May1)	Student, Faculty, Director of Graduate Studies
5.	Completion of Qualifying	End of 2nd semester if not completed earlier	Student(administered by the Department)
6.	Completion of course requirements	As soon as possible (normally done in 2 or 3 semesters)	Student
7.	Register for 898 for research	As needed starting summer of 1st year until 30 credits reached	Student
8.	Research Plan and Oral Comprehensive. Register for CHEM 790	Plan Mid third semester	Student
9.	Filing M.S. Degree Program of Study	End of 3rd semester	Student and Research Adviser

	(MPOS)		
10.	Recommendation for degree candidacy	End of 3rd semester	Chemistry Faculty
11.	Graduate Student Seminar	One by the end of 2nd year	Student & Division
12.	Register for CHEM 791	Fourth semester	Student
13.	Application for M.S. degree filed at Graduate School	By the end of 2nd year	Student
14.	1st draft of unbound thesis to the Graduate School	Three weeks before the deadline for a format check	Student
15.	Complete required 30 credits of course work by taking 898	end of second summer	Student
16.	Final draft of unbound thesis to the Graduate School	Twenty days prior to date of graduation	Student
17.	Letter to Graduate School certifying that requirements for degree have been satisfied	Not less than ten days prior to date of graduation	Director of Graduate Studies
18.	Degree Awarded	Commencement	President of the University
19.	Exit Interview	After thesis completed	Student & Graduate Director

Section 7.00 Check Points for the Doctor of Philosophy Degree

	Steps	Timing*	Responsibility
1.	Completion of placement qualifying examinations	Immediately prior to initial registration	Student (administered by the Department)
2.	Consultation with Graduate Advisor for program planning	During registration period, and 1st semester	Student and Director of Graduate Studies
3.	Completion of Interviewing	October 1 (March 1) of the first semester.	Student
4.	Choice of Research Advisor and Major	After Oct. 1 (Mar.1) but by Nov. 15 (May 1)	Student
5.	Completion of Qualifying	End of 2^{nd} semester if not completed earlier	Student (administered by the Department)
6.	Completion of course requirements	As soon as possible (normally done in 2 or 3 semesters)	Student
7..	Appointment of Ph.D. Advisory Committee	By the end of May (Dec with Jan. entry)	Student and Research Adviser
8.	Register for 898 for research	Starting summer of 1^{st} year until the last year; when writing dissertation, take 899.	Student
9.	Research Plan and Oral Comprehensive. Register for CHEM 790	Mid-3^{rd} semester	Student, defended in front of advisory committee
10.	Graduate Student Seminars	One by the end of 2^{nd} year	Student & Divisional

			Seminar Chairman
11.	Register for CHEM 791	Fourth semester	Student
12.	Pre-Proposal meeting	Early 4th or 5th semester	Student with advisory committee
13.	Research Proposal and Written Comprehensive	Mid-4th or 5th semester	Student, defended in front of advisory committee
14.	Admission to Ph.D. degree candidacy	After passing Research Proposal	Research Advisor (letter concerning research progress), and Director of Graduate Studies
15.	Ph.D. Program of Study (DPOS) approved by Advisory Committee and filed with Graduate Office	In conjunction with admission to Ph.D. candidacy	Student, Research Advisor, and Director of Graduate Studies
16.	Graduate Student Seminars	Second by the end of 3rd year	Student & Divisional Seminar Chairman
17.	Completion of planned course of study	As soon as possible	Student
18.	Complete required 60 credits of course work by taking 898 & 899. At least 12, but not more than 30, credits of 899 is required.		Student

19.	Completion of dissertation	As soon as possible (the average student reaches this point within four 1/2 years!)	Student
20.	File degree application at the Graduate School Office; records check of all degree requirements.	On or before fifteen class days after the beginning of the semester	Student
21.	First draft of dissertation to Research Adviser	About eight weeks before the dissertation is due in Graduate School Office	Student
22.	Appointment of examining committee by Dean of the Graduate School, usually identical with Advisory Committee	As soon as practical	Research Advisor and Director of Graduate Studies
23.	Submit unbound, revised dissertation with approval of Research Adviser, to the Examining Committee	Allow at least two weeks for committee approval	Student & Research Advisor
24.	Dissertation Seminar	Immediately preceding the dissertation defense	Student & Examining Committee
25.	Defense of Dissertation Examination; obtain signature of committee on dissertation approval page.	At least thirty days prior to date of graduation	Research Advisor, Examining Committee and Graduate Director
26.	Make necessary corrections on all copies of	See University Calendar	Student

	dissertation; file original and other unbound copies, plus copies of the 350 or less word abstract, at Graduate School Office. Be sure to check that all final fees are paid.		
27.	Degree Awarded	Commencement	President of the University
28.	Exit Interview and binding of work	After dissertation completed	Student & Graduate Director

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*Timing is based on a Fall entry, January entry has similar due dates noted in parentheses.

Section 8:00 Faculty and Staff

A complete list of faculty and staff can be found on the chemisty and biochemistry web site: https://sc.edu/study/colleges_schools/chemistry_and_biochemistry/index.php
Under "Our People" there is a check box to the right for "View faculty only."

Room Directory

John M. Palms Center for Graduate Science Research - **GSRC**
Jones Physical Science Center - **JONES**
Sumwalt College - **SMWALT**
Horizon I - **HZNI**

Section 9.0 Please go to the departmental web page for room and facilities. The departmental office is in GSRC 113. GSRC has offices, research laboratories and research support facilities. PSC has some chemistry and biochemistry offices, teaching and research laboratories, classrooms and research support facilities. Sumwalt has some chemistry and biochemistry offices, teaching and research laboratories, classrooms and research support facilities. Horizon I has organic research offices and laboratories.

Faculty Research Areas and Interviews

10.01 The choice of a research director and project is the most important decision of your graduate program. Because this decision has to be made rather early in your graduate studies (Section 4.06) we have formalized some aspects of the interviewing and selection process. To be eligible to select a research on or after the COMMITMENT DATE (October 1, Fall entry; March 1st, January entry), you must have attended the Faculty Research Seminars (or equivalent process) and interviewed **at least** three faculty members in their major (analytical, biochemistry, inorganic, organic, and physical) in which you wish to do research by October 1 (March 1st, January entry). [The initialed interview sheet (10.03) turned into the graduate office validates completion of the introductory interviews.] You can change your area of interest and can interview additional faculty. The research interest areas of all the faculty are defined in section 10.02 below. You are not restricted to considering one area of interest and a number of the faculty have research programs that cover more than one area. You are encouraged to explore all possibilities before you solidify your choice of general research area and a specific research director. Space and resource limitations could restrict openings in a research group so a second choice can be submitted on Form 10.03. This second choice is only to start discussions should the first choice fail. On or after the commitment date you can submit Handbook Form 10.04 to the Director of Graduate Studies to indicate your choice of research advisor(s). Assuming no complications, notification of selection into a research group will be within a week. Students with significant prior graduate experience (e.g. M.S. degree) can request exemptions from the official commitment date.

To facilitate the interviewing process, the faculty interview sheet (10.03) should be taken with you to each of your faculty interviews so that the appropriate faculty can initial and date the form in section 10.03. To approve your choice of research director, the completed interviewing form

(10.03) will have to be presented to the Director of Graduate Studies. The Director of Graduate Studies will ascertain that this decision is a mutual commitment and that all appropriate faculty have participated in the interviewing process. The Director of Graduate Studies, having confirmed the research director's commitment to you, will place the handbook form in your departmental file and notify the faculty of your choice.

10.02 As a student who has not yet selected a research director, you should begin interviewing faculty members after faculty research presentations and select a research director by November 15th. Following faculty research presentations, each graduate student must interview **at least** three faculty members in their major. Students are encouraged to interview more faculty and are not restricted to a single area. Choice of an advisor from outside the department is not usually permitted. Approval would require a successful petition to the Petitions Committee.

The list of faculty who must be interviewed (chosen area) and who might be interviewed (other faculty to consider) in each area is as follows:

Analytical

Chosen area: Angel, Ferry, Hashemi, Lavigne, Morgan, Myrick, Richardson, Shaw, and K. Shimizu.
Other faculty to consider: Students in analytical may want to talk with Adams, Berg, and zur Loye, Vogt, Chen, Vannucci, H. Wang.

Biochemistry

Chosen area: Karthikeyan, C. Outten, W. Outten, Makris, Chruszcz and Q. Wang.
Other faculty to consider: Students in biochemistry may want to talk with Hashemi, Lavigne, H. Wang.

Inorganic

Chosen area: Adams, Chen, Greytak, Myrick, W. Outten, Peryshkov, Shaw, Shustova, Stefik, Vannucci, Vogt, zur Loye.
Other faculty to consider: Students in inorganic may want to talk with C. Outten, L. Shimizu, Makris.

Organic

Chosen area: Benicewicz, Lavigne, K. Shimizu, L. Shimizu, Stefik, Tang, Q. Wang and Wiskur.
Other faculty to consider: Students in organic may want to talk with Shustova, Vannucci.

Physical

Chosen area: Adams, Berg, Chen, Ferry, Garashchuk, Myrick, Rassolov, Greytak, H. Wang, Vogt.
Other faculty to consider: Students in physical may want to talk with Angel, K. Shimizu., zur Loye, Chruszcz, Stefik.

10.03 INTERVIEW FORM

(A) Graduate Student Name:______________________________
Area(s) of Interest:_________________________________

(B) Faculty

	Date of Interview	Initials
R.D. Adams	________	________
S.M. Angel	________	________
B.C. Benicewicz	________	________
M. Berg	________	________
D.A. Chen	________	________
M. Chruszcz	________	________
J.L. Ferry	________	________
S.V. Garashchuk	________	________
A.B. Greytak		
P. Hashemi		
M. Karthikeyan	________	________
J.J. Lavigne	________	________
T. Makris	________	________
S.L. Morgan	________	________
M.L. Myrick	________	________
D. Peryshkov	________	________
V. Rassolov	________	________
C.E. Outten	________	________
F.W. Outten	________	________
S.D. Richardson	________	________
T.J. Shaw		
K.D. Shimizu	________	________
L.S. Shimizu	________	________
N.B. Shustova	________	________
M. Stefik	________	________
C. Tang	________	________
A.K. Vannucci	________	________
T. Vogt		
H. Wang	________	________
Q. Wang	________	________
S. Wiskur	________	________
H.-C. zur Loye	________	________

10.04 Research Advisor Selection

If the graduate office has a valid copy of the interview form turned in on or before October 1 (March 1st, January entry), your choice of a research advisor or advisors can be submitted to the graduate office from October 1 to November 15th (March 1st - May 1st, January entry). Early selection requires approval from the Petitions Committee.

(A) Graduate Student Name: ____________________________

Area(s) of Interest: _______________________________

(B) My Choice of Research Advisor is:______________________

My second choice of Research Advisor is: ______________________

10.05 Form for the RESEARCH PLAN and ORAL COMPREHENSIVE EXAMINATION.

This examination is required of all graduate students (section 4.10). The form on the next page should be copied and used as the PLAN title page.

Research Plan and Oral Comprehensive Exam

Name: ____________________________________

Title: ____

Submission date: ____________________

Advisor's signature (for submission): __________________________ (acknowledges advisor(s) has seen the Plan)

COMMITTEE MEMBERS | SIGNATURES (AFTER DEFENSE)

Area/Chairperson: ___________________________________ _____________________________

Area member: ___________________________________ _____________________________

Dept outside of area member: _____________________________ _____________________________

Outside of department member: _____________________________ _____________________________

(Dept.) _____________________________

Co-Advisor/other*: ___________________________________ _____________________________

The PLAN and ORAL COMPREHENSIVE EXAM was given on _______________ (date)

OUTCOME / Committee Decisions

A. Ph.D. level . <u>specific understanding</u> of the background, goals and plan of the research. ____ Pass ____ Fail

B. Ph.D level <u>research progress</u> in the lab to date. ____ Pass ____ Fail

C. Ph.D level <u>general knowledge</u> of the particular research field. ____ Pass ____ Fail

Ph.D. SUMMARY: ____ Full Pass (Three Passes) ____ Partial Pass (Two Passes) ____ Switch to MS Track (<Two Passes)

MS SUMMARY: ____ Pass at the MS level ____ Terminate grad studies

If Partial Pass (PhD level), the failed component will be re-defended in semester four and the proposal postponed to semester five

If Full Pass (PhD level), Additional Decisions by the Committee

A. <u>Proposal Timing</u>: The Research Proposal should be defended in: ____ Semester Four ____ Semester Five

B. P<u>roposal Scope</u> (Elements Different from Research, see handbook): ____ Two of Three ____ One of Three

C. <u>Research Advisor Involvement</u> in developing the student's original idea into the submitted proposal: ____ Not at All ____ Minimal

____ Significant

10.06 Form for the PROPOSAL and WRITTEN COMPREHENSIVE EXAMINATION and Advisor Letter of Research Progress for ADMISSION TO Ph.D. CANDIDACY.

This examination is required of all Ph.D. graduate students (section 4.11). This form should be copied and used as the PROPOSAL title page. Successful completion of this requirement together with a letter of research progress (bottom of form) from the research advisor is needed for admission to Ph.D. candidacy.

Research Proposal and Written Comprehensive Exam

Name: ___________________________________

Title: ____

____

Submission date: ____________________

Date of Pre-Proposal Meeting: ___________________

COMMITTEE MEMBERS (PRINT NAMES) SIGNATURES (AFTER DEFENSE)

Area/Chairperson: __________________________________ ____________________________

Area member: __________________________________ ____________________________

Dept outside of area member: ____________________________ ____________________________

Outside of department member: ____________________________ ____________________________

(Dept.) ____________________________

Co-Advisor/other*: __________________________________ ____________________________

The PROPOSAL and WRITTEN COMPREHENSIVE EXAM was given on _______________ (date)

OUTCOME / Committee Decision ____ Pass ____ Fail

Ph.D. SUMMARY: ____ Pass ____ Fail ____ Switch to MS Track

MS SUMMARY: ____ Pass the comprehensive exam for the MS ____ Terminate grad studies.

Admission to Ph.D. Candidacy

If the vote of the committee is pass, this form may be used to provide the necessary recommendation from the Research Advisor to the Director of Graduate Studies regarding the student's progress in research toward the Ph.D. degree. Alternatively, this action can be done by a separate note from the advisor to the Director of Graduate Studies.

To: Director of Graduate Studies
From: Research Advisor of Above-Named Student
Subject: Admission to Ph.D. Candidacy

The above-named student is a member of my research group, is making adequate progress in research toward completion of the Ph.D. degree and therefore should be admitted to Ph.D. candidacy.

Advisor's signature: _________________________

10.07 M.S. Program of study

MS degree requirements:

Course work [normally 5 Ph.D. level courses] = 15 credits

Graded research [790 and 791] = 6 credits

Seminar, 701 divisional seminar = 1 credit

Research in Chemistry II [898, 6 required, more credits of 898 may be needed for total of 30 credit hours]*

MS qualifying exam [plan and oral comprehensive exam, passed at the M.S. or Ph.D. level]

Research, written up in Thesis [signed by the advisor(s) and a second reader]

*Credits beyond 30 hours (e.g. additional credits of 898 or 899) are not listed on the M.S. program of study. M.S. program of study listings are not usable on a Ph.D. program of study.

10.08 Form for completion of the M.S. program of study.

Please use the G-TSF form [Thesis Signature and Approval Form] This form is found at www.gradschool.sc.edu under "Current Students" and then on the left of the page, "forms library."

10:09 Ph.D. Program of Study:

A minimum of 60 credit hours (30 beyond the M.S. degree) of graduate study is required for the Ph.D. This form also documents Ph.D. degree residency. Ph.D. residency is registration as a full-time student in three successive semesters (academic year).

Typically listed are the 5-700 level courses [15 cr], 2-701 seminars [2 cr], graded research (790, 791) [6 cr], Research in Chemistry II (898) [25 cr.]; Ph.D. dissertation prep (899) [12 cr.]; total = 60. Taking additional or less course work requires advisor and graduate director approval. This form is submitted to the graduate school after notification of Ph.D. candidacy has been received from the Graduate School.

10.10 Dissertation and thesis submission is now done exclusively on-line. Please go to www.gradschool.sc.edu and click on "Current Students" and then, "Thesis and Dissertations" will be found on the left-hand side of the page.

For Departmental Clearance:

A graduation checklist can be found at the chemistry website, https://sc.edu/study/colleges_schools/chemistry_and_biochemistry/index.php, go to MyChem/Biochem on left bottom side of page, choose Current Students, click on Graduate Students, look under Current Student Forms.

An **exit interview** is required for final clearance. Forms for the interview are on the chemistry graduate student website. If Dr. Bryson is not available for the interview, please see a member of the Admissions or Recruiting Committee.

11.00 Course Descriptions

GRAD 701 Graduate Training Seminar. In accordance with American Chemical Society certification, GRAD 701 provides training for graduate students according to the Society's guidelines. These guidelines include a rigorous observation of good safety practices, effective mentoring in modern molecular science, professional ethics and creativity in problem solving.

701 Seminar. (fall or spring, limit of 2) Required of all graduate students.

711 Physical-Inorganic Chemistry. Modern physical measurements in inorganic chemistry: X-ray, EPR, magnetism, Mossbauer spectra, ligand field theory, reaction mechanisms.

712 The Chemistry of Transition Elements. The reactions and bonding of the d and f transition elements with emphasis on organometallic chemistry.

713 The Chemistry of the Representative Elements. The structure, bonding and chemistry of the inorganic compounds of main group elements.

719 Special Topics in Inorganic Chemistry. Selected subjects from the current literature. Recent example: Bio-inorganic Chemistry. The mechanisms and metal coordination structures of metalloenzymes.

721 Electroanalytical Chemistry. Theory, application and interpretation of electroanalytical techniques including potentiometry and coulometry.

722 Spectrochemical Methods of Analysis. Optical and electronic instrumentation including signal-to-noise, systematic and random errors in flame, furnace, plasma and molecular absorption spectrometry.

723 Separation Methods in Analytical Chemistry. Theory and application of analytical separation techniques, especially gas and liquid chromatography.

729 Special Topics in Analytical Chemistry – *Environmental Chemistry*. Study of the chemical reactions and processes that affect the fate and transport of organic chemicals in the environment.

729 Special Topics in Analytical Chemistry. *Chemometrics.* This course covers the mathematical basis for statistical methods in chemometrics as well as practical applications in describing data (descriptive statistics), experimental design, and in generalizing about populations of data from smaller data sets (statistical inference, regression, and multivariate statistics). Students will also conduct several chemometrics-related project in the last half of the course.

729 Special Topics in Analytical Chemistry: *Mass Spectrometry*. This course covers the chemistry and mechanics of mass spectrometry measurements, including mass spectrometry instrumentation, ionization techniques, kinetics and thermodynamics, tandem mass spectrometry, interpretation of mass spectra, and quantification using mass spectrometry. Instrumentation for gas and liquid chromatography will be discussed in the context of interfacing these techniques to mass spectrometry for the analysis of complex mixtures from biological, environmental, and polymeric sources.

735 Structural Organic Chemistry. Basic concepts of structure, bonding, stereochemistry, and reaction mechanisms as applied to organic compounds and synthetic transformations.

736 Mechanistic and Synthetic Organic Chemistry. The development and application of chemical reactions syntheses of organic compounds.

739 Special Topics in Organic Chemistry. Selected subjects from the current literature. Recent examples: Heterocyclic Chemistry. Recent advances in heterocyclic synthesis. Stereochemistry. Conformational and structural theories applied to synthesis. Organometallic Synthesis. The use of elements such as Pt, Pd, Sn, Si, S and Se in organic synthesis. Organic chemistry of polymers.

742 Surface Science. The principles of surface processes – structure and electronic properties, adsorption and reactions, surface characterization using spectroscopy and microscopy.

743 Quantum Chemistry. An introduction to the application of quantum mechanics to problems in chemistry.

744 Statistical Mechanics. Calculations of the thermodynamic properties of chemical systems from molecular properties. Theory and applications.

745 Introductory Crystallography. Point groups, matrix representation and derivation of space groups, general and special positions, structure analysis, Patterson and electron density functions, refinement techniques.

747 Spectroscopy and Molecular Structure. "This course provides (a) an overview of infrared, near-infrared, Raman, resonance Raman, microwave, UV-Vis and fluorescence spectroscopies for molecules; (b) the use of computational methods and symmetry to predict the spectroscopy of molecules; and (c) using infrared spectroscopy to analyze the functional groups of molecules."

749 Special Topics in Physical Chemistry. Selected subjects from the current literature. Recent example: NMR Spectroscopy. High resolution solution and solid state NMR: polarization transfer, 2-D and magic angle techniques, chemical shielding anisotropy, cross polarization.

751 Biosynthesis of Macromolecules. The enzymology and regulation of DNA, RNA, and protein synthesis.

752 Regulation and Integration of Metabolism. Regulation of carbohydrate, lipid, amino acid and nucleic acid metabolism at the substrate, enzyme, organelle, cell, organ and body level and of enzyme activities and levels by metabolites and hormones.

753 Enzymology and Protein Chemistry. The isolation, structure and function of enzymes: kinetic, mechanistic, and regulatory features, amino acid and protein sequence analysis, chemical modification, higher order structures.

759 Special Topics in Biological Chemistry. Selected subjects from the current literature. Recent examples: Bio-inorganic Chemistry. See 719. Enzyme Mechanisms. Kinetic and mechanistic aspects of enzymes and co-enzymes. Biomembranes. The structure, function and biosynthesis of biomembranes and membrane proteins; membrane protein and lipid asymmetry; transport systems. Gene Regulation. Gene regulation in eukaryotes.

790 Introduction to Research. A laboratory and introduction to modern research techniques. Six hours of laboratory per week and individual consultation with instructor. (third semester)

791 Introduction to Research. A continuation of Chemistry 790. Six hours of laboratory per week and individual consultation with instructor. (fourth semester)

898 Research in Chemistry II. Directed laboratory research and readings in chemistry.

899 Dissertation Preparation.

The following specialized undergraduate courses are available for audits or M.S. degree credit only.

511 Advanced Inorganic Chemistry. The structure, bonding and reactivity of main group and transition metal inorganic molecules.

533 Intermediate Organic Chemistry. Mechanistic viewpoints with emphasis upon the chemistry of reactive intermediates.

550 Molecular Biochemistry. The chemistry and metabolism of biological compounds, biochemical thermodynamics, enzyme mechanisms and kinetics, nucleic acid biochemistry.

555/556 Biochemistry/Molecular Biology I and II. Essentials of modern biochemistry and molecular biology.

621 Advanced Analytical Chemistry. Acid-base behavior, complex formation, separations, data treatment, instrumental methods.

633 Synthesis of polymeric materials: Definitions, characterization, and applications of polymers in organic chemistry.

643 Advanced Physical Chemistry. Quantum chemistry, electronic structure, thermodynamics, statistical mechanics, the kinetic theory of gases.

Faculty Research Interests

12.01 Faculty Research Interests

R.D. ADAMS – Inorganic and organometallic chemistry including synthesis, structures, and catalytic properties of bimetallic clusters and nanoparticles; studies of metal disulfide complexes and related nanomaterials.

S.M. ANGEL – Analytical chemistry. Development of in situ characterization techniques including fiber-optic chemical sensors and remote spectroscopy including Raman, LIBS and REMPI. Of particular interest is applying optical spectroscopic techniques to environmental and process-chemical measurement problems and development of fieldable spectroscopic instrumentation.

B.C. BENICEWICZ – Polymer-organic chemistry, new monomer and polymer synthesis, polymer nanocomposites, polymer membranes for fuel cells, electrically conducting polymers, liquid crystalline polymers, controlled radical polymerization.

M.A. BERG – Physical chemistry. Ultrafast laser spectroscopy; dynamics of molecules in liquids, glasses, polymers, DNA, and other complex materials; development of new multiple-pulse spectroscopies.

D.A. CHEN – Physical chemistry. Reactions at surfaces, scanning probe microscopy, chemical analysis and characterization of surfaces, chemistry of metal nanoparticles.

M. CHRUSZCZ – Biochemistry. Structural Biology, allergy & asthma, host-pathogen interactions, immunology.

J.L. FERRY – Environmental chemistry. Fate and transport of organic chemicals in the environment, photochemically driven oxidation, photocatalysis, trace organic analysis, phytoremediation, multivariate modeling.

S.V. GARASHCHUK – Theoretical chemistry. Semi-classical dynamics, quantum effects on molecular motion, reactions in gas phase and condensed matter, scattering theory.

A.B. GREYTAK – Physical chemistry. Physical and materials chemistry at the liquid-solid interfaces of semiconductors. Energy conversion, energy storage, bioimaging, properties of semiconductor nanostructures (colloidal nanocrystals, catalytically-synthesized nanowires, and heterostructures) modified by controlling chemistry at their surfaces.

P. HASHEMI – Environmental chemistry. Electrochemistry, fast scan cyclic voltammetry, carbon fiber microelectrodes, neurotransmitter detection, *in vivo* analysis, real-time trace metal analysis, speciation studies, thermodynamic equilibrium, solution geochemistry.

M. KARTHIKEYAN – Biochemistry. Growth factor-receptor signaling mechanisms and signal transduction pathways, Epithelial and Tumor cell biology including Cell survival mechanisms, Cell migration and invasion biology, Cell adhesion and Mechanobiology.

J.J. LAVIGNE – Organic, supramolecular chemistry. Molecular recognition, supramolecular chemistry, sensors, materials, bio-organic, physical organic.

T. MAKRIS – Biochemistry. Chemical biology of antibiotic biosynthesis pathways; bioinorganic and biophysical chemistry; oxygen activation mechanisms of heme and non-heme iron enzymes; microbial alkane biosynthesis.

S.L. MORGAN – Analytical chemistry. Development of rapid methods of analysis using chromatography and mass spectrometry; forensic analytical chemistry involving textile fiber analysis and polymer analysis for trace evidence; analytical pyrolysis; chemometrics (experimental design, optimization, pattern recognition).

M.L. MYRICK – Physical and analytical chemistry. Scanning tunneling microscopy and optical spectroscopy. Experimental studies of tunneling processes through molecules and other nanometer scale moieties. Novel optical and tunneling techniques.

C.E. OUTTEN – Biochemistry. Cellular and molecular mechanisms of redox homeostasis; mitochondrial and cytosolic anti-oxidant defense systems; intracellular sulfur chemistry; molecular genetic and biochemical studies of oxidative stress resistance in yeast.

F.W. OUTTEN – Biochemistry. Microbial metal metabolism, bio-inorganic chemistry, microbial physiology, and microbial genetics; biochemical mechanisms of Fe-S cluster assembly; characterization of transition metal acquisition, trafficking, and storage systems during environmental stress; metal homeostasis during biofilm formation in micro-organisms.

D. PERYSHKOV – Inorganic chemistry. Synthesis of molecular catalysts for activation of important substrates such as dihydrogen, carbon dioxide, alkenes, etc.

V.A. RASSOLOV – Theoretical and physical Chemistry. Quantum chemistry, hyperfine interactions, use of linear operators to describe electron correlation effects in molecules.

S. D. RICHARDSON – Analytical/Environmental chemistry. Formation of drinking water disinfection by-products (DBPs); emerging environmental contaminants; fate of natural organic matter and environmental contaminants in drinking water and wastewater treatment; linking chemistry and toxicology.

T.J. SHAW – Environmental/analytical chemistry. Trace element geochemistry, environmental analytical chemistry. Techniques development for trace elements of both anthropogenic and natural origin in the environment. Geochemical cycling of trace elements in the environment.

K.D. SHIMIZU – Organic chemistry. Organic, polymer, materials, supramolecular, and physical organic chemistries.

L.S. SHIMIZU – Organic chemistry. Organic, supramolecular, materials, physical organic, polymer, and biochemistry.

N. B. SHUSTOVA – Inorganic chemistry and materials. Porous hybrid and supramolecular systems for applications in energy conversion, sensing, and bioengineering.

M. STEFIK – Organic chemistry. Functional nanostructures, energy devices, block copolymers, self-assembly, nanoparticles, photonics, atomic layer deposition, (photo)electrochemistry.

C. TANG – Organic chemistry. Organic, polymer, materials, nanoscience and nanotechnology. Multifunctional polymeric materials and macromolecular self assembly.

A. VANNUCCI – Inorganic chemistry. Electrocatalysis, inorganic chemistry, organometallics, small molecule transformation.

T. VOGT – Inorganic chemistry. Crystallography; general structural chemistry; chemical synthesis of functional metal oxides; bimetallic nanoparticles as well as x-rays and neutrons diffraction techniques and instrumentation (i.e high pressure diffraction, structures of disordered materials in particular nanomaterials).

H. WANG – Physical chemistry. Biophysical chemistry; Single-molecule spectroscopies and microscopies; Single molecule manipulation; Nanostructure fabrication;; Nanoscale self-assembly; nanophotonics; Single particle spectroscopies; Plasmon-enhanced spectroscopies.

Q. WANG – Organic chemistry. Organic synthesis, bioconjugation chemistry, biomaterials chemistry, and combinatorial chemistry.

S.L. WISKUR – Organic Chemistry. Synthetic methodology, organocatalysis, physical organic, bioorganic, sensors.

H.-C. ZUR LOYE – Inorganic materials chemistry. Synthesis of novel solid-state materials and characterization of their physical properties; investigation of cooperative structure-property relationships; crystal growth of low-dimensional oxides and investigation of their electronic and magnetic properties; synthesis of organic/inorganic framework materials; synthesis of polymer nanocomposites.

CHEMISTRY & BIOCHEMISTRY: PH.D. CURRICULUM GUIDE/CHECK LIST (REVISED 5-26-16)

60 HOURS REQUIRED FOR GRADUATION[1]

This schedule is a *guideline*. Actual registration should be decided upon by advisor and student.

Ph.D. requires 60 hours and this plan totals 55 hours. Therefore, five additional hours of 899 must be taken.

NOTE: To finish in less than four years, this schedule must be accelerated.

Coursework Year 1

Semester 1		Hours	Semester 2		Hours
3 Graduate Courses		9	2 Graduate Courses		6
Faculty Research Seminars[2]		0			
Total		9	Total		6
Summer		Hours	Submit Committee Appointment Request form		
898 Research in Chemistry II		1	(G-DCA) by end of May (Dec for Jan entry) to		
Cumulative Total		16	the Graduate Office.		

REQUIREMENTS

Year 1: Join a research group by end of first semester. Achieve DGPR of 3.0 and qualify in two areas by end of second semester.

Coursework Year 2

Semester 3		Hours	Semester 4[4]		Hours
PLAN/Oral Comp			Proposal/Written Comp		
790 Intro to Research (graded)		3	791 Intro to Research (graded)		3
			701 Seminar[3]		1
898 Research in Chemistry II		3	898 Research in Chemistry II		2
Total		6	Total		6
Summer		Hours			
898 Research in Chemistry II		1			
Cumulative Total		29	*DPOS & PhD candidacy		

Years 2 & 3: Research plan defense (third semester) and research proposal defense (fourth or fifth semester).
Present first seminar by end of fourth semester and second by end of sixth semester.

Coursework Year 3

Semester 5		Hours	Semester 6		Hours
898 Research in Chemistry II		5	898 Research in Chemistry II		6
701 SEMINAR[5]		1			
Total		6	Total		6
Summer		Hours			
898 Research in Chemistry II		1			
Cumulative Total		42			

*DPOS & Admission to PhD Candidacy - after successful plan and proposal defenses plus recommendation of advisor on research progress. Must submit doctoral program of study (DPOS); occurs at end of fourth or fifth semester

Coursework Year 4

Semester 7		Hours	Semester 8		Hours
899 Dissertation Prep[6]		6	899 Dissertation Prep[6]		6
Total		6	Total		6
Summer		Hours			
899 Dissertation Prep[6]		1			
Total		1			
Cumulative Total		55			

Years 4 & 5: Research until dissertation defense (public seminar and then committee meeting).

1 30 hours required if student enters with M.S.

2 Short research seminars by faculty: attendance required for students admitted in fall semester:

3 701 Seminar – first must be presented by end of fourth and the second by the end of the sixth semester.

4 M.S. program requires 30 credits: M.S. and Ph.D. programs are basically the same through semester 4 except the Proposal /Written Comp is not required for the M.S. M.S. students continue to enroll in 898 (6 credits required) until graduation and must be registered for 1 credit during the final semester. To graduate with M.S. at the end of Year 2, additional credits must be taken in the final summer. The M.S. requires a thesis with a second reader.

5 Second 701-seminar alternative: take 6 credits 898 in the fall, 5 credits 898 + 1 credit 701 in the spring.

6 Ph.D. requires 60 hours and this plan totals 55 hours. Therefore, at least five additional hours of 899 must be taken. Students in Ph.D. program

continue to enroll in 899 until graduation and <u>must</u> register for at least 1 credit during dissertation defense semester.

Program Summary

12.02 Summary of the Ph.D. Degree Program

- Orientation: Safety, OSHA and Chemical Hygiene training; Degree regulations; Teaching (recitation and laboratory) instruction, Advisement, Registration, ACS Qualifying or Placement exams.

- **Year 1:** Five "700 (Ph.D.) level courses", 3 in the area of research interest -- 2 outside the area (Analytical and Biochemistry option: 4 and 1); Attend faculty research seminars, interview faculty and choose research advisor; Start research; GPA of at least 3.0; Select Ph.D. Committee; Qualify/show advanced knowledge in 2 areas (paths to qualification; Pass ACS area tests or get a B or better in designated graduate core courses).

- **Years 2 & 3:** Research; Research Plan and Oral Comprehensive exam (Fall) - Summary of the dissertation research plan and progress to date; Research Proposal and Written Comprehensive exam (Spring or Year 2 or Fall of Year 3) - Original research idea; First divisional literature seminar (1st or 2nd year); Second divisional literature seminar (2nd or 3rd year); Admission to Ph.D. candidacy (after completion of the above in combination with a letter of research progress from the research advisor).

- **Years 4 & 5:** Complete research; Write, present (dissertation seminar) and defend Dissertation; Graduation; Exit Interview.

Faculty Research Presentations 2016 (tentative)

Date	5-5:20 pm	5:20-5:40 pm	5:40-6 pm
Wed, Aug 10			
Thur, Aug 11	Bryson/K. Shimizu	Zur Loye	Myrick
Fri, Aug 12	SACS pool party	(5:30-7:30)	
Mon, Aug 15	Vogt	Lavigne	H. Wang
Tue, Aug 16	Morgan	Ferry	
Wed, Aug 17	Stefik	C. Outten	L. Shimizu
Thur, Aug 18	Wiskur	Greytak	Berg
Fri. Aug 19	Angel		Richardson
Mon, Aug 22*	Peryshkov	Makris	Garashchuk
Tue, Aug 23	Hashemi	K.Shimizu	
Wed, Aug 24	Shustova	Chruszcz	Shaw
Thur, Aug 25	W. Outten	Rassolov	
Fri. Aug 26	Q. Wang	Tang	Karthikeyan
Mon, Aug 29			
Tues, Aug 30	Chen	Vannucci	
Wed, Aug 31			
Thurs, Sept 1			
Fri, Sept 2			

*Ethics Workshop from 4-5 pm GSRC 101

Faculty Presentations are in GSRC 101.

Attendance is mandatory, in partial fulfillment of GRAD 701 requirements.

Aug 8, 2016