RULES AND REGULATIONS

GOVERNING

GRADUATE WORK IN

CHEMISTRY AND BIOCHEMISTRY

To Be Revised Fall 2013

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Introduction

The Department of Chemistry and Biochemistry offers graduate work leading to the Master of Science and Doctor of Philosophy degrees. A sufficient breadth of course work is offered so that the students can take all their course work in chemistry and biochemistry. However the Departments of Biology, Chemical Engineering, Mathematics, and Physics as well as the molecular biology program also offer graduate courses and provide allied areas for possible outside minors. Graduate students may emphasize, by their selection of courses and research, the areas of analytical, inorganic, organic, physical, or biochemistry. The graduate program is designed to teach students modern approaches to chemistry and biochemistry (courses), experimental methods to problem solving (research), an communication skills in the discipline (seminars and colloquia). Compliance with all rules, regulations, and procedures of the graduate school as set forth in the current ***Graduate Bulletin*** is required of all chemistry graduate and biochemistry students.

Admissions

Entering graduate students should have completed baccalaureate degree and a course of study essentially equivalent to that offered by the Department of Chemistry and Biochemistry at New Mexico State University. In the event that there are undergraduate deficiencies, these will be recorded on the "Certificate of Admission". All deficiencies should be removed within one year by taking the appropriate formal courses or by passing special examinations. In any case, they must be removed before the student qualifies for an advanced degree or prior to their enrollment in certain graduate courses.

To be admitted into the department as a regular graduate student, the candidate must not have any undergraduate deficiencies and should ideally have a GPA of 3.0 or above for either their total undergraduate record or during the last two years of work taken for their baccalaureate degree. It is the graduate school-not the department-that

actually determines whether a student is eligible for admission as a regular student or not based on their undergraduate transcripts.

Students admitted on a provisional status, because of either low grade point average or undergraduate deficiencies, must complete their first three graduate courses, consisting of at least nine semester hours of credit, with a grade average of B or better.

At the time of admission, a maximum of six semester hours of graduate credit toward the master's degree may be transferred at the discretion of the advisor/Head of the department and the Graduate Dean, provided the grades are at least a B.

Financial Assistance

The Department of Chemistry and Biochemistry annually awards a number of graduate teaching and research assistantships. Applications for theses assistantships can be obtained from the departmental office. Both types of assistantships involve 20 hours per week of time either in research work, or in preparation for and conducting undergraduate laboratory and recitation classes, and grading papers. All graduate students will be required to teach for at least one semester (or two laboratory sections) unless granted a special exemption by the department head. Teaching assignments will be considered as part of a continuing educational process. The Dean of the Graduate School determines the stipend for each classification of assistantships annually. In addition, the Department of Chemistry and Biochemistry normally has available a number of one month teaching assistantships for the summer at the same monthly rate of pay. Graduate student levels are determined as follows: The student is a Level l until having passed the qualifying examination and completed 30 hours of graduate credit or earned a master's degree. Upon completion of these two milestones the student becomes a Level ll. Level ll is attained upon passing the doctoral oral comprehensive examination.

The Chemistry and Biochemistry Department also participates in campus programs in which various federal fellowships or traineeships are available. The stipend

for these awards is determined by the granting agencies. When the granting agency places restrictions on the student's involvement in a teaching responsibility, the teaching requirement can be waived.

The Department **will not** normally provide financial assistance to a master's candidate for more than three years. Appointment as a graduate assistant of a doctoral candidate is limited to five years, but a sixth year of support can be obtained by successful petition to the graduate school if the candidate has passed his/her doctoral oral comprehensive examination.

Academic Performance

The student will be expected to maintain a high level of academic achievement. Grades of A and B are considered satisfactory. The student must maintain an overall B average to remain in good standing and to qualify for the award for an advanced degree and continued financial assistance. However, the ultimate decision as to whether a candidate will be granted continued financial support and allowed to progress towards the masters or doctoral degree will be based upon performance in (1) coursework, (2) the qualifying examination, (3) the doctoral comprehensive examination (written and oral components), (4) by continuing demonstration of research progress and () satisfactory performance of their teaching/research assignments.

In order to maintain an awareness of current developments in chemistry, students will supplement their course work by independent study and by attendance at ALL DEPARTMENTAL seminars AND colloquia. STUDENTS SHOULD ATTEND lectures at local scientific meetings WHENEVER POSSIBLE.

The Role of the Advisor

At the time of admission to the Graduate School, the student will be assigned to one of the departmental graduate student advisors. As soon as possible after arrival on campus, the student should arrange a conference with this advisor. Together they will decide upon the courses to be taken the first semester.

A first year student selects a research problem and an advisor after consultation with every graduate faculty member having research problems in the student's area(s) of interest. The student will normally talk to these professors during the first semester. The student will select a research problem before the end of his/her first semester and the director of the research will become the advisor. Together, the student and advisor will develop a program of study that is filed with the Graduate School and this is to be followed unless the committee, the Department Head, and the Dean of the Graduate School approve substitutions.

The student consults with the advisor on all matters pertaining to this graduate program. The advisor arranges for any special examinations that are necessary and subsequently arranges for a time, place, and committee for oral examinations. The student's faculty advisor is responsible for identifying a dean's representative and completing all examination paperwork.

Candidates for a graduate degree will have a committee appointed by the advisor and the department head at the time they complete their qualifying examination. The committee will serve to advise the student, approve his/her program, hold an annual progress meeting with the student, and conduct his/her subsequent oral examinations. At the annual meeting with his/her graduate committee, each student shall submit a progress report of his/her research covering the period since his/her last meeting. For doctoral students, this committee will consist of three members from the Chemistry/Biochemistry department and one from outside who will serve as a Dean's representative. Additional members may be added to this committee as needed but not supplant the aforementioned members.

Course and Examination Requirements

Each graduate student must take core courses from three out of the five areas of specialization offered in the department. These core courses are BCHE 542 or 546, Biochemistry; CHEM 506, 507, 508 or 509 Inorganic; CHEM 514, 515, 516, 517 Organic; CHEM 526, Analytical; and CHEM 536, 537, 538, or 539, Physical Chemistry. These core courses should be taken during the student's first year in Graduate School.

Qualifying Examination

After completing the required core courses in the selected division, the student will take a qualifying examination over undergraduate and first year graduate material in that same division. Based upon performance in course work and the qualifying examination, the student will be advised regarding future plans for graduate study. Students entering with a M.S. degree shall be allowed to take the written qualifying examination in their area of interest at the earliest opportunity.

The Department can make one of the following recommendations depending on the student's performance on the qualifying examination:

(1) recommend that the student work toward the doctorate (or first the masters degree)

(2) recommend that the student's program be limited to the master's degree

(3) recommend that the student's background be strengthened and to retake the qualifier at the next offering

(4) recommend that the student discontinue graduate work.

Students who are not admitted to the Ph. D. program can repeat the qualifying examination at the next offering. The examination cannot be repeated more than once. In the event that a student retakes the qualifier, the department will make a new recommendation as regard to his or her status after evaluation of their performance. If the student passes the qualifying examination (Masters or

doctorate level) the student, the advisor and the department Head will work together to appoint a committee. The committee will help the student to prepare a program of study appropriate for the degree and his or her research emphasis, which then will be filed with the graduate school.

Students who have passed the qualifying exam at the doctoral level in one division, but decide to change areas, can proceed to the written comprehensive examinations in their new area at the earliest opportunity given the consent of the faculty in that division.

All Ph.D. candidates in the Biochemistry Division must also participate in the Biochemistry literature seminar series, which meets weekly. Attendance at this series is obligatory beginning with the first semester of enrolling In the Biochemistry graduate program. All absences must be excused (family or personal emergency, illness). Participation as a seminar presenter is obligatory beginning with the second semester after enrollment. The oral presentation will be graded as Pass/Fail and will constitute part of the requirements for the Comprehensive Examination, see Biochemistry section.

Doctoral Degree

There are no minimum credit requirements for the doctor's degree; instead, emphasis for this degree is placed upon the attainment of a certain level of competency in the subject matter area. However, the candidate should expect to take about 30-40 credits of graduate course work and register for a minimum of 18 credits of dissertation (CHEM 700). The Graduate School prefers the doctoral student is also required to give one departmental seminar (oral presentation to the department) for credit. The requirements for seminar are appended to this report.

The student may select a minor in another area of chemistry or in an outside department after discussion with his/her advisor and approval by the

committee. The student in consultations with their committee establishes the program, which the student will follow.

Doctoral Comprehensive Examinations

The doctoral comprehensive exam consists of written and oral components with formats determined by the different divisions in the department for the written component. The student will follow the format announced by his/her division. The mode of administration is determined by the faculty within the area of study (division) of chemistry that most closely relates to the students area of research (i.e., analytical, biochemistry, inorganic or physical chemistry).

Written Cumulative Examinations

These Examinations will be taken by the student at the earliest opportunity after admission into the Ph.D. program.

Analytical

The written comprehensive examination in analytical chemistry shall consist of four examinations administered two weeks apart during the fall semester of each year. Each exam will consist of five (5) questions. Four of these questions will pertain to the topics of spectrochemical methods of analysis, electrochemistry, separation science, and wet methods of chemical analysis. The fifth question on each exam will involve specific topics pertaining to modern analytical chemistry. These topics may include, but are not limited to the areas of chemo metrics, materials (including nano-scale fabrication), environmental analysis, bio analytical chemistry, and sensor miniaturization. The specific topics addressed by the examinations will be announced at least two weeks prior to the administration of the first examination. Within one week of completion of

the fourth exam, the faculty of the analytical division within the Department of Chemistry and Biochemistry will convene for the evaluation of the cumulative performance of each student on the totality of the four examinations. Because the written comprehensive examination will consist of multiple examination sessions, the judgment of the faculty will be final with no additional opportunities afforded to the student. Those students who successfully complete the written comprehensive examination in Analytical Chemistry are strongly recommended to schedule and undertake their oral comprehensive examination within four weeks of notification of their success.

Biochemistry

The written examination shall consist of a formal research proposal. This proposal is written to conform to the current guidelines for NIH, NSF or USDA competitive grant proposal and covers a Research Plan or Statement of Work (excluding ancillary legalese forms, budgets, etc.). The proposal should not be less than ten single space, type written pages but not exceed fifteen, excluding references. The work proposed should be reasonable for a three-year grant duration. This written proposal may not be based on a topic under investigation in the research of the student or by members of the student's research group. The student may verbally discuss ideas for this proposal with student peers and committee members, however, the concepts, approach and execution should fundamentally originate with the student. The major advisor may review a draft for readability and clarity; however, the advisor will not assist in the actual writing of the grant proposal nor may the proposal be circulated for review or comment until it is submitted to the divisional faculty and student's thesis committee. Once submitted, the division members and committee members have seven working days to respond to the major advisor whether the written grant proposal is read to be examined or is deficient. Written comments from the division and committee members justifying a deficiency vote will be

forwarded to the student, without identity, by the major advisor, two or more votes of deficiency will return the proposal to the student for rewrite, which must be resubmitted to the committee within ten working days. A maximum of two rewrites is permitted. After the student's division and graduate committee determines that the written proposal is acceptable, an oral examination may be scheduled.

This proposal must be scheduled within the first four semesters following successful completion of the Qualifying Examination for candidates that hold a B.S. degree. For students entering the Ph.D. program after completion of a M.S. degree, it must be scheduled within the first three semesters following entry into the Ph.D. program.

All Ph. D. candidates must participate in the biochemistry literature series. Attendance is mandatory. After the second semester in this series, each student will be required to present and the oral presentations will be graded as Pass or Fail. This record constitutes part of the Comprehensive Examination. The topics of these presentations shall be chosen from the following broad topics: Nucleic Acids and Molecular Genetics; Proteins and Enzymes; Metabolism; Photosynthesis; Physical Biochemistry; Bioinformatics. Each student will present a minimum if six seminars with a final grade of PASS. Four of the six requisite presentations must be given in four different areas in the above listing. Each seminar should critically review current original research in the approved topic area. Visual aids should be used in the presentation and are to be of professional quality.

Inorganic

The student will be required to begin a consecutive series of written cumulative examinations, which will be administered once a month during the academic year. Each month a new topic is selected by the professor that covers the recent literature. The selection of topic, journals and time frame will be announced at

least two weeks before the exam is scheduled. It is the students' responsibility to contact the professor to obtain this information. The student must take each examination that is offered until five examinations out of a maximum of fifteen are passed. The student's committee must review student progress if (1) two of seven or (2) three of nine exams taken are not passed.

Organic

The student is required to begin a consecutive series of written cumulative examinations, which will be administered once a month during the academic year. The exam questions will be based on recent literature and will cover reaction mechanism, synthesis, structural elucidation, and related applications of organic chemistry. Representative journals include Organic Letters, J. Organic Chemistry, Tetrahedron Letters, J. Am. Chem. Soc., Org. Biomol. Chem., Organometallics and Angewandte Chemie International Edition and additional journals identified by the faculty. Students are expected to take each examination until five examinations out of a maximum of fifteen are passed. The student's committee must review student progress if (1) two of seven or (2) three of nine exams taken are not passed.

Physical

The student will be required to begin a consecutive series of written cumulative examinations which will be administered once a month during the academic year. Each month a new topic is selected by a professor that covers the recent literature. The selection of topic, journals and time frame will be announced at least two weeks before the exam is scheduled. It is the students' responsibility to contact the professor to obtain this information. The student must take each examination until four examinations out of a maximum of twelve are passed. The student's division and graduate committee must review student progress if (1) two of seven or (2) three of nine exams are not passed.

After passing the cumulative examinations, the student will be required to prepare a grant proposal. The proposal must be ten to fifteen single-spaced typewritten pages and conform to NSF guidelines, omitting budget and legalese pages and references. The writing must be the student's original contribution. The proposal must be distributed and then approved by all members of the Physical division and the student's graduate committee with a simple majority vote within ten working days of its submission. If the proposal is deemed unsuitable (by vote), then the student has ten working days to resubmit it for re-review. Two re-submissions are permitted.

Oral Comprehensive Examinations

Following successful completion of the written portion of the comprehensive examination, the student will take an oral examination at the time designated by his/her committee and approved by the Graduate School. The examination must be taken within four months of passing the written portion of the comprehensive examination. The oral examination will be of general type and can cover all aspects of the student's course of study and research (this can include the research proposal). The student's graduate committee will administer the examination. The object of this examination will be to determine the student's potential to do doctoral-level research. The criteria for judging the performance on the exam will be knowledge of major and minor areas of study and communication skills. The committee may offer the student a chance to reappear for this examination if he or she fails on the first attempt.

Milestones for the Doctor's Degree

1. The student should meet with the graduate advisor to arrange a schedule-of-classes for the first semester. These classes will be based on his/her personal interests and the area in which he/she plans to major.
2. All course deficiencies must be removed during the first year by taking or auditing the appropriate course or by special examination.

3. The student must meet the core course requirements; take one credit of seminar and at least 18 credits of research. Students usually take all courses offered in their area of interest and pertinent to their research. The average grade point for all graduate courses must be at least 3.00 an all grade requirements of the graduate School must be met.
4. The qualifying examination in his/her major area must be taken after having completed the core courses in the area of study at the end of the second semester of the first year. If the qualifying examination is not passed, one additional trial may be made after a lapse of one semester, subject to departmental approval.
5. Upon successful completion of the qualifying examination and selection of a research problem, the student's advisor (in consultation with the student) will appoint the doctoral committee to prepare a program of study, hold annual meetings, and administer examinations. This includes selection of a Dean's representative.
6. At the first opportunity after qualifying for the doctoral program, the student must begin to start taking the written portion of the doctoral comprehensive exams (per division requirements).
7. After passing the written portion of the comprehensive exam, the student has one semester to schedule and take an oral comprehensive examination, which will be administered by the members of the student's doctoral committee. By permission of the examining committee, a student who fails the comprehensive examination may request a single re-examination after a lapse of at least one semester.
8. An application for the degree must be made with the Graduate School prior to the deadline given in the University Calendar.
9. The form and style of the dissertation must comply with the regulations in the Thesis Form Manual.

10. A copy of the dissertation must be in the hands of each committee member at least seven days before the final oral examination.
11. The final oral examination must be completed as per graduate school deadlines in order to graduate in the targeted semester.
12. Following the final examination and approval of the dissertation, four unbound copies of the dissertation must be delivered to the Graduate Office for approval by the Dean. After they are bound, the four copies will be distributed: two to the Library, one to the Chemistry and Biochemistry Department, and one to the major Professor.
13. All financial obligations to the Chemistry and Biochemistry Department and to New Mexico State University must be discharged prior to graduation and all grade-books, keys and other teaching materials returned. All research notebooks will be turned into the research adviser and all research space will be put into a condition deemed acceptable to the adviser. All materials generated during the execution of the thesis research shall be the property of the research adviser. A form used in this regard is to be obtained from the departmental office.

MASTER'S DEGREE

The student will normally complete a minimum of 24 credits in graduate courses exclusive of research, including the core course requirements, and pass the qualifying examination at the Masters level or better. Each student is also required to complete at least six credit hours of thesis research and submit a satisfactory thesis. **For Masters level students, a public presentation of their thesis work is required as a part of their oral examination.** A student can be awarded an M.S. degree without writing a thesis by completing all the Ph.D. requirements through the oral comprehensive examination. The department does not directly admit a student for a MS (non thesis) degree.

Milestone for Master's Degree

1. The student should meet with the graduate advisor to arrange a schedule of classes for the first semester. These classes will be based on departmental requirements, the student's personal interest and the area in which a major is planned.
2. The student must complete a minimum of 24 additional credits in graduate courses and meet the core course requirements. The average grade point of all graduate courses taken must be at least 3.00 and all the general grade requirements of the Graduate School must be met.
3. The student must pass the written qualifying examination in the selected major area of chemistry at the master's degree level. This exam is to be taken upon completion of the core courses in that field at the end of the second semester of the first year.
4. The student must complete a satisfactory thesis with at least six credits of CHEM 599.
5. An application for the degree must be made with the Graduate School prior to the deadline given in the University Calendar.
6. The thesis must comply with the regulations in the Graduate Bulletin.
7. A copy of the thesis must be in the hands of each committee member at least seven days before the oral examination.
8. In order to graduate in a given semester the date of the oral exam must follow graduate school deadlines.
9. All financial obligations to the Chemistry and Biochemistry Department and to the University must be discharged prior to graduation and all grade books, keys, and other teaching materials returned. All research notebooks will be turned into the research adviser and all research space will be put into a condition deemed acceptable to the adviser. All materials generated during the execution of the thesis research shall be the property of the research

adviser. A form used in this regard is to be obtained from the departmental office.

10. Four copies of the thesis (two for the Library, one for the Chemistry and Biochemistry Department, and one for the major professor) must be delivered to the Graduate School.

APPENDIX I: GUIDELINES AND PROCEDURES FOR GRADUAE STUDENT SEMINAR PRESENTATIONS

1. All doctoral degree candidates will present one formal departmental seminar (usually a power point presentation) to fellow graduate students and the faculty. This presentation will receive a grade from the faculty member responsible for that course (i.e., 500, 510, 520, 530, or 540).

   Doctoral students shall complete the requirements for the respective seminar course through the presentation of a seminar on a topic not related to their subject of their thesis research.

2. The faculty members responsible will coordinate the schedule for the student seminars with the enrolled students. The student's advisor and/or the instructor on record will provide necessary help/guidelines to the student in their seminar preparation.

   To aid candidates in the preparation and presentation of their seminars, the following timetable and expectations are offered.

A. Selection of Topic (Doctoral Candidates)

1. Selection of the 500-level seminar topic will be the student's choice. However, every topic must be approved by the seminar instructor in this particular area. The topic cannot be in or closely related to the research interests of the student's research advisor.
2. A definite seminar topic must be submitted to the professor in charge at the time of selection of presentation dates Hence, individuals intending to present a seminar in a particular semester should actually begin selecting and preparing their topic the semester prior to enrolling, since seminars will be given beginning the second week of each semester.
3. Select the topic, which is sufficiently well defined (of sufficient breadth and specialty) to allow coverage of all background material within 10 to 20 minutes. The remainder of the seminar should cover new developments of primary significance to the topic based on current research papers.
4. The primary emphasis should be new developments and primary data, not summary data. Reproduction of textbook material, review articles, or formerly encountered lecture material on an extensive scale will be considered unacceptable, except as introductory material.

B. Abstract

1. Prior to the seminar, each student will prepare and distribute to the faculty a detailed abstract of their talk. It should be written so as to provide an individual who wants to know "the state of the art", with a concise introduction to the field and an entry into the current literature.

2. It should be limited to five or six pages (including references), double-spaced with one-inch margins. Abbreviations should be fully described the first place they are used. References should be cited within the body of the text. The format of the *Journal of the American Chemical society* should be used in listing references. Any tabular data or figures deemed appropriate to the abstract should be included in the form of an additional appendix.
3. The abstract must be checked by the seminar instructor before duplication at least one week in advance of the actual presentation. Students are expected to type their own abstract and the office secretaries will duplicate the abstract, which is then dispersed by the student. It should be distributed to the faculty at least one week before the scheduled seminar.

C. Presentation

1. Normally a seminar should require 45 minutes followed by a 15-minute discussion period. Shorter presentations will probably receive more critical reviews. However, one must know vastly more material than can be presented in 45 minutes if a successful discussion period is to follow. It is assumed that the speaker will have a reasonable understanding of every concept introduced.
2. Do not read or memorize your talk. Speak clearly and loud enough for the audience to hear. Do not speak to the chalkboard.
3. Visual aids (PowerPoint, models etc.) should be commensurate to one's personal pride.
4. Avoid use of slang; these presentations are formal expositions.
5. Thoroughly define all abbreviations.
6. It is a good idea to practice your seminar at least once before a live critical audience.

D. Grading

1. The instructor in charge of the class will assign the grade. The faculty member will decide how he/she will use faculty comments and if comments from the faculty from within the student's are will be weighed more or the same as those from other faculty.
2. The comments of the faculty will be relayed orally to the students.
3. Letter grades (A, B, C, etc.) will be used to grade seminars. Grades of C or lower will be considered unacceptable and the student may be required to present another seminar at the earliest reasonable date.

APPENDIX II: Responsibilities of the Graduate Student

The graduate student is expected to work hard to gain a broad understanding of his/her discipline in addition to a more in depth knowledge of the area of specialization. Students are also expected to discharge teaching and research assistantship responsibilities in a superior and professional manner. Furthermore, the responsibility for complying completely with the rules of the graduate school as set forth in the current "Graduate Bulletin" belongs to the student and not to the advisor.

Graduate Record Examination

Each domestic graduate student is recommended to take the general aptitude portion of the Graduate Record Examination. This examination should be completed before the beginning of the first semester on campus. Each foreign graduate student is required to have taken the general aptitude portion of the Graduate Record Examination prior to admission to the graduate program of study in Chemistry and Biochemistry.

Security

The inventory of equipment of the Chemistry and Biochemistry Department is very large and many of its items are portable and, therefore, subject to possible theft. It this becomes the responsibility of each person who has authorization to enter any area where equipment is stored to assume responsibility for the safeguarding of this equipment.

Each person who has justification for entering the building or using any room in the building at times when it is not regularly open will be authorized to receive the appropriate keys. These keys may be obtained by applying to the secretary of the Chemistry and Biochemistry Department, who will issue the proper keys after authorization by the advisor or the Head of the Department. Those with keys must not allow their use by an unauthorized person nor should they admit such people into any locked area without remaining in that area with them. Each person is requested to take special caution not to lose any of his/her keys. When the student no longer has need for any keys, they must be returned to the Departmental Secretary.

Members of the chemistry and biochemistry staff may use the stockroom during normal working hours. However, all staff members are required to sign out with the stockroom attendant any pieces of equipment or chemicals removed from the stockroom. Under no circumstances is any undergraduate student to be permitted access to the stockroom.

Outside doors leading into the Chemistry and Biochemistry Building are locked at certain times in the evening and on the weekend. Whenever it is necessary to use your key to enter the building, it is imperative that you re-lock the door through which you enter. Outside doors are not to be opened to students at unauthorized times, since it is likely that no responsible personnel are present during these times. Should the building be found unlocked at times when it should be locked, the campus police should be notified.

Equipment

The Chemistry and Biochemistry Department owns several pieces of expensive equipment. This equipment is intended for research and instructional purposed. It is required that anyone using such equipment be thoroughly familiar with its operation and use it in accordance with accepted procedures. Should any equipment be moved from one location to another, it is necessary that the departmental inventory (contact the instrumentation manager) indicate its current location. Therefore, advise the stockroom attendant whenever you move any piece of tagged equipment. Each piece of equipment in the instrument room is under the supervision of a specific faculty member who should be consulted regarding is use or repair.

There are certain teaching supplies such as class roll book, lab manuals, and other secretarial necessities, which are provided to all teaching and research personnel. These are not, however, for personal use except as needed in chemistry. Such materials may be obtained through your research advisor or course instructor. All class roll/grade books are to be returned to the departmental office when they are filled or when the student's teaching duties have been terminated. This constitutes a part of the departmental student records, which need to be available after a graduate student has left.

The department also has audiovisual equipment t be used in teaching. This equipment is available to teaching personnel for use in their classes and must be properly checked out. You should consult with the faculty member in charge of the course if you wish to use such equipment.

Library Use

The Graduate-Research reading room located room 135 has many valuable reference books and current periodicals. There are also computers available for student use. Books cannot be moved outside the reading room except for the specific purpose of Xeroxing pertinent articles and must be returned immediately.

Laboratory Housekeeping and Safety

Each student must attend the safety orientation provided by the Department and the campus safety office before working in any teaching or research laboratories. All graduate students must undergo the required safety and hazard training as required of their teaching and research responsibilities. This will include briefing on the required Right-to-Know information.

Safety regulations regarding conduct in the laboratory are posted in several places in the building and in the laboratories. The graduate assistant should become familiar with these and should require that each student in the laboratory read these regulations. Safety goggles and appropriate clothing must be worn at all times in the laboratory when laboratory work is in progress. This rule is absolute and exceptions will not be made. This most important safety rule not only protects the students from injury, but it also protects the graduate students from a possible lawsuit that could result from injury. Also, students are never permitted to work in any laboratory unless there is an instructor present to supervise their work. If a student wishes to work beyond the close of the regular laboratory period, the assistant may remain with him- otherwise; the student must leave at the end of the scheduled time when the laboratory assistant leaves the laboratory. All students should familiarize themselves with the nearest fire-fighting equipment and first-aid supplies for each area in which they work. All students are required to comply with all regulations dictated by the Occupational Safety and Health Administration (OSHA) as interpreted by the Department or University Safety Officer(s).

Graduate assistants are responsible for the condition of the laboratory in which they instruct. At the close of each laboratory period each student should clean the desk, the reagent provided on the side shelf should be clean and in order at the end of the laboratory period. Periodic checks on housekeeping will be made by the instructor in charge of the course.

Housekeeping in the research laboratories is equally important. It is the responsibility of the student doing research to see that he/she meets all standard safety regulations are met and working space in the laboratory is kept in reasonable order and neatness.

Seminar Attendance

Full-time graduate students are required to attend all seminars, whether registered for credit or not. Whether or not they present a seminar will depend upon their registration during the current semester. They are also expected to participate in discussion classes in their area of interest.

Secretarial Assistance

The main responsibilities of the departmental secretaries are to handle routine materials for the Department and to do necessary secretarial work for the teaching and research staff and faculty. If graduate students have material to be typed, they should plan to handle this work themselves. Computers are available on campus and in the department for the students' use. However, Departmental machines are not to be used for personal purposes. The Department will duplicate and distribute certain materials related to the student's course of study provided that these materials are provided no less than five (5) days prior to the required date for their distribution.

APPENDIX III: Courses required for Qualifying Examinations

(By Division)

Analytical

CHEM 526 Advanced Analytical Chemistry

Biochemistry

BCHE 542 Biochemistry I
BCHE 545 Molecular and Biochemical Genetics
BCHE 546 Biochemistry II

Inorganic

CHEM 508 Main Group Determination
CHEM 509 Transition Metal Chemistry

Organic

CHEM 514 Organic Structure Determination
CHEM 515 Modern Organic Chemistry
CHEM 516 Physical Organic Chemistry
CHEM 517 Synthetic Organic Chemistry

Physical (two of the following)

CHEM 536 Chemical Thermodynamics
CHEM 537 Quantum Chemistry
CHEM 538 Chemical Kinetics
CHEM 539 Spectroscopy

APPENDIX IV: Departmental and course Descriptions from the Graduate Catalog

The Department of Chemistry and Biochemistry offers programs leading to the M.S. and Ph.D. degrees in the areas of physical, organic, inorganic, biological, and analytical chemistry. Admission to these programs without deficiency is based on an undergraduate program essentially equivalent to that pursued by a chemistry or biochemistry major at this university. An entering student is encouraged to take the Graduate Record Examination (aptitude) to increase his or her chances for financial support. All foreign students must take GRE and TOEFL and must demonstrate adequate English speaking and writing skills.

Students who wish may take a minor in chemical toxicology or molecular biology. The core course work required of students entering with no previous graduate study in chemistry consists of basic courses in three of the five major areas represented in the department. A master's candidate will plan an appropriate program of further study with his or her advisor and is also required to prepare a thesis. The thesis requirement may be waived upon application to the department head, after completion of the doctoral comprehensive examination requirements. A student who successfully completes the Ph.D. qualifying examination will begin writing the cumulative examinations, which constitutes the written portion of the comprehensive examination. At this point the doctoral committee is formed to assist the student in planning a program appropriate to his or her background and goals. Since research is central in both the master's and doctoral programs, the early selection of a research advisor is encouraged. The student is expected to participate in the colloquia and seminar programs. Financial support is available to graduate students in chemistry though numerous teaching and research assistantships as well as federally supported

traineeships and fellowships. Inquiries regarding these opportunities should be directed to the head of the department.

CHEMISTRY

CHEM 451. Special Topics 1-3 cr.
Topics to be announced in the schedule of Classes. Prerequisite: consent of instructor. May be repeated for a maximum of 12 credits.

CHEM 452. Integrated Advanced Laboratory 3 cr. (1+6P)
Applications of the principles of organic, inorganic, physical, and analytical chemistry to solve particularly defined but open-ended problems in chemistry. Prerequisites: CHEM 315, CHEM 356, CHEM 371, CHEM 433.

CHEM 452H. Integrated Advanced Laboratory-Honors 3 cr. (1+6P)
Same as CHEM 452. Additional work to be arranged.

CHEM 456. Inorganic Structure and Bonding 3 cr.
Theoretical principles and a systematic study of the periodic table. Prerequisite: CHEM 433.

CHEM 456H. Inorganic Structure 3 cr.
Same as CHEM 456. Additional work to be arranged. Prerequisite: CHEM 433

CHEM 466. Advanced Organic Chemistry 3 cr.
Recent developments in synthesis and theoretical principles of organic chemistry. Prerequisite: CHEM 314

CHEM 466H. Advanced Organic Chemistry 3 cr.

Same as CHEM 466. Additional work to be arranged. Prerequisite: CHEM 314

CHEM 471. Instrumental Methods of Analysis 4 cr. (3+3P)

Analytical techniques, including optical and procedures. Prerequisites: CHEM 371 and either PHYS 212 or PHYS 216.

CHEM 472. Analytical Methods for Toxic Organics and Metal Ions in the Environment 3 cr. (2+3P)

Laboratory course with lectures on principles of analytical techniques related to environmental monitoring of pollutants and waste management. Prerequisite: either CHEM 371, C E 462, or consent of instructor.

Prerequisite for the following courses is consent of instructor.

CHEM 500. Seminar in Organic Chemistry 1 cr.

Current topics. May be repeated.

CHEM 508 Main Group Chemistry 3 cr.

Chemistry, structure and bonding of main group elements are covered along with some spectroscopy.

CHEM 509. Transition Metal Chemistry 3 cr.

Discussion of the reactions and structures of inorganic transition metal compounds.

CHEM 510. Seminar in Organic Chemistry 1 cr.

Current topics. May be repeated.

CHEM 514. Organic Structure Determination 3 cr.

Modern spectroscopic techniques for characterization of organic compounds.

CHEM 515. Modern Organic Chemistry 3 cr.

Recent developments in synthesis and theoretical principles of organic chemistry.

CHEM 516. Physical Organic Chemistry 3 cr.

Physical organic chemistry.

CHEM 517. Synthetic Organic Chemistry 3 cr.

Synthetic methods in organic chemistry.

CHEM 520. Seminar in Analytical Chemistry 1 cr.

Current topics. May be repeated.

CHEM 521. Chemical Instrumentation 3 cr. (2+3P)

Theory and application of electronic devices to chemical analysis. Prerequisite: PHYS 212

CHEM 526. Advanced Analytical Chemistry 3 cr.

Equilibria, and the theories of gravimetric, volumetric, and instrumental analysis.

CHEM 527. Separations 3 cr.

Covers the fundamentals of separation methods and relationships to modern analytical techniques such as gas chromatography and liquid chromatography.

CHEM 528. Electroanalytical Techniques 3 cr.

Theory and application of modern electrochemical methods of analysis including voltammetry, amperometry, modern cyclic and pulse methods, and stripping analysis.

CHEM 529. Spectrochemical Analysis 3 cr.

Fundamentals, Instrumentation, and applications of spectrochemical analysis.

CHEM 530. Seminar in Physical Chemistry 1 cr.

Current topics. May be repeated.

CHEM 536. Chemical Thermodynamics 3 cr.

First, second, and third laws of thermodynamics, and the concepts, interrelations, and applications of thermodynamic state functions.

CHEM 537. Quantum Chemistry 3 cr.

Fundamentals of quantum mechanics. Prerequisite: consent of instructor.

CHEM 538. Chemical Kinetics 3 cr.

Empirical analysis of rate measurements, collision theory, transition state theory, and chain reactions.

CHEM 539. Spectroscopy 3 cr.

Molecular spectroscopy for physical chemistry. Quantum mechanics applied to spectroscopy of polyatomic molecules: UV-Vis, IR, magnetic resonance. CHEM 537 desired but not required. Prerequisite: consent of instructor.

CHEM 540. Seminar in Environmental Chemistry 1 cr.

Current topics in environmental chemistry. May be repeated for a maximum of 3 credits.

CHEM 550. Discussions in Inorganic Chemistry 1 cr.

Current research problems in inorganic chemistry. May be repeated. Graded S/U.

CHEM 560. Discussions in Organic Chemistry 1 cr.

Current research problems in organic chemistry. May be repeated. Graded S/U.

CHEM 570. Discussions in Analytical Chemistry 1 cr.

Current research problems in analytical chemistry. May be repeated. Graded S/U.

CHEM 580. Discussions in Physical Chemistry 1 cr.

Current research problems in physical chemistry. May be repeated. Graded S/U.

CHEM 590. Discussions in Environmental Chemistry 1 cr.

Current research problems in environmental chemistry. May be repeated for a maximum of 3 credits. Restricted to majors. Graded S/U

CHEM 598. Special Research Programs 1-3 cr.

Individual investigations, either analytical or experimental. Graded S/U.

CHEM 599. Master's Thesis var. cr.

Thesis.

CHEM 600. Research var. cr.

Course used for assigning credit for research performed prior to successful completion of the doctoral qualifying examination.

CHEM 606. Physical Methods in Inorganic Chemistry 3 cr.

Application of symmetry properties and techniques such as NME, ESR, IR, visible, UV, ORD, and CD spectroscopy to inorganic problems.

CHEM 609. Topics in Inorganic Chemistry 1-3 cr.

Selected topics of current interest designated by subtitle.

CHEM 619. Topics in Organic Chemistry 1-3 cr.

Selected topics of current interest designated by subtitle.

CHEM 639. Topics in Physical Chemistry 1-3 cr.

Selected topics of current interest designated by subtitle.

CHEM 650. Advanced Seminar 1 cr.

Intended for students who have earned a master's degree or the equivalent. A discussion of current topics of interest in chemistry. May be repeated.

CHEM 700. Doctoral Dissertation var. cr.

Dissertation.

BIOCHEMISTRY

BCHE 451. Special Topics 1-3 cr.

Prerequisite: consent of instructor. May be repeated for a maximum of 12 credits.

Same as CHEM 451.

BCHE 494. Techniques in Genetic Engineering 4 cr. (2+6P)

Basic laboratory techniques required for research involving recombinant DNA technology: structured experimental procedures, including nucleic acid isolation and purification, as well as the identification and manipulation of genes and genetic material of both bacterial and plant origin. Prerequisites: BCHE 395, 396, and consent of instructor.

BCHE 540. Seminar in Biochemistry 1 cr.

Formal seminar presentation in current topics in biochemical research. May be repeated for a maximum of 3 credits.

BCHE 542. Biochemistry 1 3 cr.

Relationship between macromolecular structure and function. Basic enzymology. Energy metabolism. Prerequisite: CHEM 421 or CHEM 433.

BCHE 545. Molecular and Biochemical Genetics 3 cr.

An accelerated treatment of the molecular basis of gene expression. Discussion of chemical, enzymological, and genetic techniques of molecular biology, prerequisite: BCHE 542 or equivalent. Same as BIOL 545.

BCHE 546. Biochemistry II 3 cr.

Intermediary metabolism: catabolic and anabolic pathways of carbohydrates, lipids, amino acids, and nucleic acids, including their regulation. Prerequisite: BCHE 542 or BCHE 395.

BCHE 590. Discussions in Biochemistry 1 cr.

Current research problems in biochemistry. May be repeated for a maximum of 3 credits. Graded S/U.

BCHE 598. Special Research Programs 1-3 cr.

May be repeated for a maximum of 6 credits. Same as CHEM 598.

BCHE 599. Master's Thesis var. cr.

May be repeated for a maximum of 6 credits. Same as CHEM 599.

BCHE 600. Research var. cr.

May be repeated for a maximum of 20 credits. PR/U grading. Same as CHEM-600.

BCHE 643. Biochemical Regulation 3 cr.

Current topics in cellular regulation at the enzyme level are discussed and integrated with known control processes at higher levels of cellular organization.

BCHE 648. Proteins and Enzymes 3 cr.

Theories and mechanisms of enzyme catalysis, chemical modification of proteins, general acid-base catalysis and nucleophilic catalysis as they pertain to enzymes, advanced enzyme kinetics, and formulation of enzymatic rate equations. Prerequisite: BCHE 546.

BCHE 649. Topics in Biochemistry 1-3 cr.

Selected topics of current interest designated by title and credit. May be repeated for a maximum of 3 credits.

BCHE 650. Advanced Seminar 1 cr.

Discussion of current topics of interest in biochemistry. Intended for students who have earned a master's degree of the equivalent. May be repeated for a maximum of 3 credits.

BCHE 700. Doctoral Dissertation var. cr.

May be repeated for a maximum if 20 credits. Graded PR/U. Same as CHEM 700.

Toxicology

Industry, as well as federal, state, and municipal government agencies, has a growing need for scientists and engineers with an understanding of toxicological problems The toxicology program has been designed to provide instruction in general, environmental, and occupational toxicology for students majoring in areas of science, agriculture, or engineering. Master's or doctoral students may minor in toxicology by completing the introductory course and at least two of the advanced courses.

TOX 451. Occupational Toxicology 2 cr.

Laws and regulations governing production, use and disposal of toxic or hazardous materials. Prerequisite: consent of instructor. Same as E-S-453.

TOX 461. Toxicology 1 3 cr.
Same as ANSC 461.

TOX 523. Environmental Toxicology 3 cr.
Introduction to the most rapidly growing branch of toxicology. Covers tests required by the EPA to determine human and environmental safety of pesticides and industrial pollutants; discussion of environmental fate of major pesticide classes and industrial pollutants. Prerequisite: TOX 361 or TOX 461.

TOX 550. Special Topics 1-3 cr.
Readings, discussions, and/or field and laboratory investigation of selected problems. Typical examples: pharmacology, reproductive toxicology, environmental toxicology, or mutagenesis. Prerequisite: consent of instructor, and designation of a specific topic before registration.

TOX 598. Special Research Programs 1-3 cr.
Individual investigations, either analytical or experimental. Graded S/U.

GRADUATE STUDENT SELECTION OF RESEARCH ADVISOR

_____ has discussed research problems with each of the following faculty members in his/her area of interest (division).

_____

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I agree to serve as the research advisor for the above graduate student.

_____

Signature of Faculty Advisor Date

_____

Approval of Department Head Date

Please return this form to the Chemistry/Biochemistry Office when completed.