

**Arizona State University
Chemistry and Biochemistry**

**Graduate Programs
Student Handbook**

Requirements and Procedures

Fall 2009

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Graduate Programs in Chemistry and Biochemistry

Student Requirements and Procedures Handbook

2009-2010

Introduction

The objective of this handbook is to outline the requirements set forth by the Department of Chemistry and Biochemistry for graduate students enrolled in programs leading to the M.S. and Ph.D. degrees. These requirements are established to enable students to progress through their program in a productive and timely manner. The graduate programs offered by the department are directed toward the attainment of excellence in chemistry and biochemistry as demonstrated by research accomplishment, coursework, and examination.

In addition to the requirements set by the department, students must follow those established by the Graduate College, which can be found in the [Arizona State University Graduate Catalog](#).

Graduate Programs Committee

The Department of Chemistry and Biochemistry Graduate Programs Committee (GPC) is responsible for the development of new programs and serves as the governing board for the department in determining program requirements. The committee is responsible for informing students of these requirements, reviewing petitions when program requirements can not be met and resolving other matters that may be brought before the committee. The Graduate Programs Committee, with the assistance of the Graduate Programs Coordinator, monitors each student's progress toward the completion of program requirements as stated in this handbook in an effort to maintain program consistency and encourage the awarding of the degree in a timely manner. The committee consists of Department of Chemistry and Biochemistry tenured or tenure-track faculty who are assigned by the Chair of the department, the Graduate Programs Coordinator, and a student representative who is also selected by the Department Chair. The faculty members represent the different research areas of study within the department. All members have a counting vote and meet bi-weekly during the academic year.

Questions regarding these requirements and procedures may be referred to the Graduate Programs Coordinator, via email (currently – martha.mcdowell@asu.edu), by phone at (480) 965-4664 or in person in PS D 103. Current Graduate Programs Committee members can be found in Appendix A.

Graduate Programs

The Department of Chemistry and Biochemistry offers the following graduate degrees:

Master's in Science in Chemistry
Doctor of Philosophy in Chemistry

Master's in Science in Biochemistry
Master's in Science in Biochemistry with a Concentration in Medicinal Chemistry
Doctor of Philosophy in Biochemistry

Dual Degrees

The Department of Chemistry and Biochemistry does not typically allow students to pursue other degrees in conjunction with a graduate degree in the department. Exceptions will be analyzed on a case by case basis by petition to the Graduate Programs Committee.

Members of the Graduate Programs and Members of the Graduate Faculty

The Graduate Faculty model at ASU allows PhD programs to expand their PhD faculty membership to include faculty from other programs provided that they have the appropriate expertise. The Members of the Chemistry and Biochemistry Graduate Faculty are listed online at <http://graduate.asu.edu/gradfaculty>. The members of the Chemistry and Biochemistry graduate programs are the tenured or tenure-track faculty that hold appointments in the department, and are listed in the departmental website: <http://chemistry.asu.edu/graduate/facultyResearch.asp>.

The Graduate Faculty includes all members of the Chemistry and Biochemistry Programs and faculty from other programs. The distinction becomes important when addressing who can serve as chair or member of dissertation and examination committees for the different programs. Students need to check the specifics for their program of study.

New Student Mentors

Each new student is assigned a Temporary Faculty Mentor who they will meet during the New Student Orientation/TA Training. The central role of the temporary Mentor is to assist the student in the selection of courses in a student's first semester in his/her program and guide the student, if needed, in selecting an area of research. The new students will choose their Research Advisor before the end of the first semester. As soon as the student has chosen a Research Advisor, the Advisor takes over the responsibilities from the Mentor.

Duration of Programs

Research is a major component of the chemistry and biochemistry graduate programs. Therefore, the length of time to complete a degree is dependent on the individual student's progress in the laboratory as well as meeting other degree requirements, including coursework and total semester hours in a program. The Research Advisor and the student's Supervisory Committee evaluate and determine the completeness of a student's research project as indicated in the program requirements that follow in this handbook.

Typically, students in the M.S. degree programs can complete requirements for the degree in two years. According to the Graduate College requirements, the Master's degree must be completed within six consecutive years – continuous enrollment in all Fall and Spring semesters is required. The count begins from the first semester of admission to the student's program.

Students in the Ph.D. degree programs typically take four to five years to complete the program. The M.S. degree is not a prerequisite for the Ph.D. program; however, students who enter the Ph.D. program with a previously earned M.S. degree in Chemistry or Biochemistry may possibly complete their program in three to four years if they have achieved exceptional research accomplishments. The Ph.D. degree must be completed within five years after passing the Comprehensive Examination or the maximum of ten consecutive years from the time of initial enrollment – whichever is shortest. Continuous enrollment in all Fall and Spring semesters is required.

Financial Support

The department provides financial support to Ph.D. students enrolled in the Chemistry and Biochemistry programs, as indicated in the offer letter, by means of a Graduate Teaching Assistant, Graduate Research Assistantship or a Fellowship.

Subject to available funding, students enrolled in the Ph.D. degree programs are offered financial support for five years if they make satisfactory progress toward their degree, maintain good academic standing in the program, and receive satisfactory teaching evaluations. Support as a Graduate Teaching Assistant may be limited to eight semesters, i.e. four years. Financial support beyond the fifth year is contingent on approval from the student's Research Advisor and Graduate Programs Committee.

Students enrolled in the M.S. degree in Chemistry and the M.S. degree in Biochemistry receive financial support for a period of two years depending on available funding, satisfactory progress toward the degree, good academic standing in the program, and satisfactory teaching evaluations. Financial support beyond the second year is contingent on approval from the student's Research Advisor and Graduate Programs Committee.

Students enrolled in the M.S. degree in Biochemistry with a Concentration in Medicinal Chemistry are not typically appointed as a Graduate Teaching Assistant due to the design of the program (i.e. they are not granted financial support for their graduate studies). However, they may be considered for such an appointment upon request of the student and with the support and approval of their Research Advisor - dependent on department need.

Students funded by the department or university may not hold additional employment of any kind.

Research Assistantships are contingent on funds available to research advisors and are awarded at their discretion. Graduate Assistants/Associates must meet program requirements and be enrolled in at least nine credit hours – the Graduate Programs Committee recommends twelve credit hours. Students supported by a Fellowship must meet the requirements specified by the fellowship.

Students who have been in a Chemistry/Biochemistry PhD Program for more than two years and decide to drop to a Chemistry/Biochemistry Master's Program will be given an additional two semesters of financial support to complete their Master's Program. The student must maintain satisfactory academic progress and TA evaluations for every semester enrolled in the program. Students who need more than the additional two semesters to complete their degree requirements may petition the Graduate Programs Committee for additional support. The Graduate Programs Coordinator can assist students with this process.

Please note: If English is not a student's native language, he/she must pass the English language SPEAK Test to qualify for support as a teaching assistant. Students are required to demonstrate continued progress in English language skills each semester and achieve Full Certification as determined by the SPEAK Test to ensure financial support.

Program Residency Requirement

Graduate students must be continuously enrolled from the first semester of enrollment in their program - Fall and Spring semesters. If a student is unable to attend, he or she must apply for a leave of absence. This includes students requesting a medical (including the birth of a child) or military leave. Students complete the Graduate College form, "Petition to the Graduate College", found on their website: <http://www.asu.edu/graduate/forms/>. The completed form is submitted to the Graduate Programs Coordinator who will present the request to the Graduate Programs Committee. Unless extenuating circumstances exist, this petition should be submitted the semester prior to when the student is requesting the leave. If the student's need is immediate, the Graduate Programs Coordinator will work with the student to be sure the petition is expedited. The student will be notified of the decision or contacted if additional information is needed. If the petition is approved on the departmental level, the Graduate Programs Coordinator will deliver the petition to the Graduate College for final consideration.

Absence Policy

Students supported on a Graduate Research Assistantship who desire to take time off during the winter holidays and summer months must have the approval of their research advisor. The decision to allow the leave is determined by the research advisor, based on the individual needs of the student and the research in progress. Students financially supported by a Graduate Teaching Assistantship should not plan to take time off during the semester in which they have an appointment. If a situation, such as an illness or an emergency occurs, the student must contact the professor who teaches the course and the TA Coordinator. Students assigned to a TA position are required to attend TA meetings prior to the beginning of the semester and should contact the TA Coordinator for the anticipated dates of the pre-semester meetings.

Safety Seminars

The department maintains a high standard of safety in the teaching and research laboratories. Therefore, all graduate students are required to attend and complete Safety Seminars before beginning work in the laboratory. Initial training in the areas of Fire Safety and Prevention, Laboratory Safety and Hazardous Waste Management is mandatory for all students entering the program. Students working in research laboratories that use blood or other potentially infectious materials are also required to take training on Blood Borne Pathogens. Safety Training refresher courses are also required to be taken on a yearly basis.

Credit Hours per Semester

The Graduate Programs Committee recommends that students enroll in 12 credit hours per semester during Fall and Spring semesters. Summer session enrollment is contingent on the student's financial support. Enrollment information will be sent to students by email at the beginning of summer registration.

Students must enroll in the 501 seminar each semester as indicated in their particular program. They should not take more than two classes in addition to the 501 seminar for each semester so as to allow enough time for research. However, the student should discuss these recommendations with his/her advisor.

Academic Integrity

Academic dishonesty will not be tolerated, and if uncovered, appropriate actions will be taken. Students are expected to familiarize themselves with what constitutes violations to the academic integrity policy. A detailed list of violations can be found online (<http://provost.asu.edu/academicintegrity>). Briefly, violations include (but are not limited to) cheating on exams and assignments, plagiarizing, fabricating data or information, etc. Students are encouraged to pay special attention to the definition of plagiarism so as to avoid unintentional mistakes, and discuss the topic further with their advisors and instructors if they are unclear on whether a particular action constitutes plagiarism.

Allegations of academic dishonesty will be reviewed by the Graduate Program Committee who will decide on the appropriate actions. This may include reporting the student to the Graduate College with a recommendation for dismissal from the program.

STRUCTURE OF CHEMISTRY AND BIOCHEMISTRY PROGRAMS

Supervisory Committee

Every graduate student enrolled in the Chemistry and Biochemistry graduate programs is required to have a Supervisory Committee to support him/her in his/her research and evaluate the culminating experience. The Supervisory Committee consists of at least three members: the student's Research Advisor, who is the student's main mentor, and two additional tenured or tenure track faculty members. The Research Advisor is the Chair of the Supervisory Committee.

A detailed description of who can serve on the Supervisory Committee for the Chemistry and Biochemistry Master's Degree and PhD Programs are provided in the appropriate sections that follow.

This committee is responsible for the final evaluation of the Applied Project, Master's thesis or Ph.D. Dissertation defense and for determining if program requirements have been met for awarding the degree. Yearly meetings with the committee are optional, but recommended, and are held as informal discussions.

Comprehensive Examination Committee

In addition to a Supervisory Committee, students enrolled in the Ph.D. Chemistry and Biochemistry Programs have a Comprehensive Examination Committee. This committee determines if the student is able to integrate his/her knowledge in chemistry and/or biochemistry with his/her current or future research and has the potential to continue to achieve the level of performance expected of a PhD candidate. The student's Research Advisor is not a member of the Comprehensive Examination Committee. Committee members consist of the remaining members of the Supervisory Committee, an additional faculty member selected by the student in conjunction with his/her Research Advisor and a faculty member assigned by the Graduate Programs Committee. A description of who can be selected to serve on the Comprehensive Examination Committee is given in detail in the PhD Programs sections of this handbook.

Advisor and Committee Selection

Students have the opportunity to meet potential research advisors and learn about their research during the New Student Seminar – CHM 501. They also have the option of participating in lab rotations and/or making appointments with advisors to discuss research projects and opportunities. Lab rotations (if chosen) and the selection of a Research Advisor must be completed by the end of the student's first semester in the graduate program.

Supervisory and Comprehensive Examination Committee Member selection is required by the end of the second semester.

When a Research Advisor is selected (by the end of the first semester) the student completes the top portion of the Committee Selection Form (see Appendix B) including the Research Advisor section with the signature of the faculty member who will serve as the student's Research Advisor. If the student has selected other Members of the Supervisory and Comprehensive Examination Committee, he/she turns in the completed form to the Graduate Programs Coordinator. If only the Research Advisor is selected, the student should Xerox the form and submit the copy to the Graduate Programs Coordinator. When the remaining Committee Members are selected (by the end of the second semester) the original form is completed and submitted to the Graduate Programs Coordinator.

The Graduate Programs Coordinator submits the Committee Selection Form to the Graduate Programs Committee for final approval and, for Ph.D. students, to assign the Chair for the Comprehensive

Examination Committee. The student and the Committee Members are sent an email notifying them of the final committee assignment.

Committee Members who are not tenured or tenure-track ASU faculty members may require additional paperwork and approval from the Graduate College. The Graduate Programs Coordinator will work with the student to fulfill this requirement.

Interactive Plan of Study

The Interactive Plan of Study (iPOS) is basically an agreement between the student and the department indicating courses the student needs to take to complete program requirements. It is not a transcript and is not used for employment purposes. The GPA calculated on an iPOS is used only to determine if a student has met the GPA requirement for the total semester hours required for his/her program. The iPOS must be approved by the Graduate College before a student can request to take the Comprehensive Examination, advance to candidacy and/or graduate. The Department of Chemistry and Biochemistry requires students to complete the iPOS during the second semester in their program. The process of completing and submitting the iPOS is done through MyASU. Instructions for completing the iPOS can be found on the Graduate College website: http://graduate.asu.edu/files/pdfs/POS_student_manual.pdf. See Appendix C for an additional reference in completing the iPOS.

Master in Science in Chemistry

Master in Science in Biochemistry

Outline of M.S. Program

Minimum Requirements for the MS Program in Chemistry and Biochemistry – 30 semester hours and a research thesis

End of first semester: Student chooses Research Advisor

End of second semester: Student chooses Supervisory Committee Members

Beginning of
Second semester Complete Interactive Plan of Study

Student completes required course work, research project and writes thesis

3-6 months prior to Thesis Defense Technical Review with Supervisory Committee

Apply for Graduation

Submit thesis for format review and schedule Final Defense to Graduate College – 10 Day Rule

Submit thesis title, abstract, publications, names of members of the Supervisory Committee and logistics of final defense to the Graduate Programs Coordinator

Defend thesis

Make revisions to thesis if needed

Submit “Report for Master’s Thesis/Practicum Defense” for to the Graduate Programs Coordinator
(Coordinator will submit the form to the Graduate College for Dean’s Signature)

Pick up “Report for Master’s Thesis/Practicum Defense” form from Graduate College and submit two copies of the thesis to the Bookstore for binding – Five bound copies: two for the university library, one for the Research Advisor, one for the department and one for the student.

Duration of Program

The Master’s Degree can be typically completed in two years; however, more time may be needed depending on the research project. According to the Graduate College requirements, the Master’s degree must be completed within six consecutive years – continuous enrollment in all Fall and Spring semesters is required. The count begins from the first semester of admission to the student’s program.

Supervisory Committee

The Supervisory Committee consists of at least three members: the student’s Research Advisor, who is the student’s main mentor, and two additional tenured or tenure track faculty members. The Research Advisor is the Chair of the Supervisory Committee.

Who can serve as Research Advisor, i.e. Chair of the Supervisory Committee?

- The Research Advisor must be selected from tenured or tenure track members of the Chemistry and Biochemistry Graduate Programs. A complete listing of the faculty members can be found on the Department website at: <http://chemistry.asu.edu/graduate/facultyResearch.asp>.

Who can serve as Research Co-Advisor (optional)?

- Members on the Chemistry and Biochemistry Graduate.
- ASU Tenured or tenure-track faculty members from a science-related field or engineering may serve as co-advisors with approval from the Graduate Programs Committee and the Graduate College. (Student should see the Graduate Programs Coordinator)
- Emeritus faculty.
- Non-tenure-track faculty members, research professionals or non-ASU professors or researchers may serve as co-advisors with approval from the Graduate Programs Committee and the Graduate College. (Student should see the Graduate Programs Coordinator)

Who can serve as a Supervisory Committee Member?

- Members of the Chemistry and Biochemistry Graduate Programs.
- Tenured or tenure-track faculty members from a science-related field or engineering
- Emeritus faculty
- Non-tenure-track faculty members, research professionals or non-ASU professors or researchers may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. (Student should see the Graduate Programs Coordinator)

The Supervisory Committee serves as the Thesis Committee for M.S. students. Additional faculty or researchers can be added to the committee after the Plan of Study and/or the Comprehensive Examination has been completed. Students, who want to add an additional Member, should see the Graduate Programs Coordinator.

Supervisory Committee Member Summary: (See Appendix D)

The Chair of the Supervisory Committee must be selected from faculty members from the Chemistry or Biochemistry Graduate Programs. Members can be Chemistry/Biochemistry Programs Faculty, Emeritus ASU faculty or a tenured or tenure-track faculty member in a science-related field or engineering with the approval of the Graduate Programs Committee. A non-ASU professor or researcher may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. Students can have more than three Members (including the Chair) but not less than three. **At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the Chemistry and Biochemistry Programs.**

Course Requirements

A total of 30 credit hours and a Master's thesis are required and must include:

- Four 500 level courses (2-3 credit hours each)
 - One of the four courses may be taken outside the Department of Chemistry and Biochemistry, but must be related to the student's research. (2-3 credit hours each)
 - A maximum of one 400 level course may be substituted for one required 500 level course. 400 level courses can only be taken with approval of the research advisor or mentor. (2-3 credit hours each)
 - CHM 498, Chemical Terminology for International Students, and CHM/BCH 590 can not be used as one of the course requirements, but can be used toward the total 30 semester hours
- CHM 501 New Student Seminar for students entering in the Fall Semester
- CHM/BCH 501 each semester enrolled in the program (up to 4 semesters required)
- Research (CHM/BCH 592) is required for every semester the student is involved in research
- Six hours of Thesis (CHM/BCH 599) must be taken and included on the student's Program of Study.
- The remaining hours can be filled by taking additional courses, 400 or 500 level (2-3 credit hours each), related to the student's research, or by taking research credit hours.

Note on Courses:

Students can take more than one 501 seminar per semester, but only one per semester is counted toward the total required.

The Graduate Program Committee does not recommend taking more than two classes per semester in addition to the 501 seminar, so as to allow enough time for research. However, the student should discuss these recommendations with his/her Research Advisor.

A cumulative GPA of 3.0 or better must be maintained on a yearly basis

Transfer Courses

Courses taken as a graduate-non-degree student at ASU or at another university in the US or Canada **that have not been counted toward a previous degree** may be used toward the required number of courses and total semester hours needed for the MS degree. The courses must have been completed within three years prior to the admission to the student's current program. A maximum of two courses may be used toward the four required courses for the Master's Program. A minimum of two 500 level courses must be taken at Arizona State University. Courses must have been completed within The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript (original transcript must be on file at the Graduate College) showing the final grade for the course(s) and a written request to the Graduate Programs Coordinator who will present it to the Graduate Programs Committee. The student will be sent an email informing him/her of the committee's decision and instructions on how to proceed if the courses are approved.

Extracurricular Courses

Students interested in taking courses in addition to those included in their Plan of Study should obtain authorization from their research advisors regardless of the student's source of financial support. This includes classes outside their field of study (e.g. business, languages, religion, art, recreation, etc) Authorizations are required for each course, and should be sent to the Graduate Programs Coordinator. Students that enroll in extracurricular courses without approval are subject to loss of financial support from the advisor and/or the department.

Scholastic Requirements

The required GPA is 3.0 and is monitored on a yearly basis. A student whose GPA drops below 3.0 is not considered to be progressing in the program satisfactorily. Lack of progress in research is determined by the Research Advisor and is reported to the Graduate Programs Committee. An appointment will be made for the student to meet with a member of the Graduate Programs Committee to explain the circumstances for the deficiency. The committee member will discuss this meeting with other members of the committee and the student will be sent an email or letter reviewing the deficiency and what must be done to relieve the deficiency within a specified time period. Consequences of unsatisfactory performance are discussed in the Program Deficiencies sections of this manual and may include the following recommendations:

- The student is placed on department academic probation until the deficiency is remedied
- Student is advised to find a different Research Advisor
- Student is advised to change the degree of their program (ex. M.S. instead of Ph.D.)
- Recommendation that the student be dismissed from the program

However, if a student's GPA falls below 2.0 at any time, the Graduate Programs Committee may ask the Department Chair to write a letter to the Graduate College recommending immediate dismissal from the student's current graduate program.

Program Progression

Selecting a Research Advisor and Supervisory Committee

Students are required to join a research group by the end of their first semester and form a Supervisory Committee by the end of the second semester. (See procedures in selecting a Research Advisor and Supervisory Committee described earlier in this section) Students who have not made a selection should contact The Graduate Programs Coordinator to discuss the circumstances as to why this requirement was not met. Based on the discussion, a meeting with the Graduate Programs Committee Chair may be scheduled or the student may be required to write a formal petition to the Graduate Programs Committee. Students who do not follow this procedure and do not meet the conditions that have been set for them are not progressing in their program satisfactorily and will be reported to the Graduate Programs Committee. Based on the committee's decision, the student will receive an email or letter specifying a time period within which the requirement must be met. Consequences for not completing the requirement are presented in the *Program Deficiencies* section of this manual.

Interactive Plan of Study

The Interactive Plan of Study, as described in the *Programs Structure* section, should be completed the end of their first semester in residency.

Technical Review

Three to six months prior to the thesis defense, the student is required to meet with his/her Supervisory Committee to present the research he/she has accomplished so that the student may receive feedback on the direction of the research and gives suggestions for improving any areas of weakness. This review commonly consists of a 20 minute presentation prepared by the student on his/her research progress and a discussion on any manuscripts in preparation. The committee will question and advise the student to guide him/her in the completion of his/her degree. There is a form, which can be located on the Department website that needs to be signed by committee members to verify that the review was completed.

Master's Thesis

A Master's Thesis, detailing the research accomplished at Arizona State University, is required as a demonstration of the student's research technique and ability to draw conclusions from his/her data. It must include an introduction, description of the research and a discussion of the results. The format of the report must follow the Graduate College guidelines (www.asu.edu/graduate/formatmanual). Examples of the M.S. thesis are available from the Research Advisor and the Graduate Programs Coordinator.

A copy of thesis must be submitted to each member of the Supervisory Committee **at least two weeks** prior to the final M.S. thesis defense.

Apply for Graduation

The Graduate College has firm deadlines which are posted on their web page: <http://www.asu.edu/graduate/generalinfo/GradDdlns/index.html>. Students who are nearing graduation should refer to this website to verify dates. The application can be found at: <http://www.asu.edu/registrar/forms/pdf/mailapp.pdf>. Students take the completed graduation application to the Cashiers office, located on the second floor of the Student Services Building, to pay the fee and then submit the form and their receipt to the Graduation Office (Registrar's Office) on the first floor.

Schedule of Defense Form and Format Review – 10 Day Rule

Two Graduate College forms are required to be completed before the final defense: “Master’s Defense Schedule Form” and “Format Approval Sheet” (<http://www.asu.edu/graduate/forms/>). These completed forms and a copy of the thesis must be submitted to the Graduate College **at least 10 days** before the final defense – See definite deadline dates set by the Graduate College (<http://www.asu.edu/graduate/generalinfo/GradDdlns/index.html>).

Schedule the Final Defense with the Supervisory Committee

Students contact the members of their Supervisory committee to determine the best date for the final defense. When the date and time is established, the student reserves a conference room for the defense. Conference rooms on the first floor of the Physical Science building are reserved in the main Chemistry/Biochemistry office – PS D 102.

Announcement of the Master’s Final Defense

An announcement of the student’s final defense must be made in written form to all students, faculty and staff in the Department of Chemistry and Biochemistry and related departments. Five working days before the defense, the student must email an abstract, list of publications and information concerning the logistics (date, time and place) and names of the committee members to the Graduate Programs Coordinator. The announcement will be created and shown to the student for final approval. When the student approves the final draft, a paper copy and an electronic copy of the announcement is circulated to the faculty, students and staff in the Chemistry and Biochemistry Department. An electronic copy is also be sent to departments with related research interests.

Master’s Final Defense

The final defense of the thesis must take place at **least two weeks prior the date of graduation**. It consists of a formal oral presentation of the student’s thesis, open to the public, followed by a closed session with the student and his/her Supervisory Committee. The closed session involves an in-depth questioning by the committee to verify the student’s knowledge of the research topic and its significance.

Documentation of Final Defense

When the student has passed the final defense, all members of his/her Supervisory Committee must sign the “Report for Master’s Thesis/Practicum Defense” form provided by the Graduate College to the Chair of the committee. Section B of this form must be completed by the Supervisory Committee Chair indicating if revisions need to be made. When all revisions are completed, the Chair signs the bottom of the form – Section D verifying final approval of the thesis document.

The form is submitted to the Graduate Programs Coordinator who obtains the signature of the department chair and hand delivers the document to the Graduate College for the Dean to sign. The Coordinator will email the student that the document was delivered and instruct the student to pick up the document from the Graduate College Office after a period of 24 to 48 hours. The student makes a copy of this form for each copy of the thesis to be bound and submits all copies to the ASU Bookstore for binding.

Thesis Binding

The student arranges for five bound copies of the thesis: two copies for the Hayden Library and Archives, one copy for the Research Advisor, one for the department and one for the student.

The Awarding of the Degree

The degree is awarded when the student has accomplished the following:

- Satisfactorily completed required coursework with a cumulative GPA of 3.0
- Conducted research at ASU under the direction of a tenured/tenure track faculty member in the Department of Chemistry and Biochemistry
- Written a M.S. thesis approved by the Supervisory Committee
- Successfully presented and received a grade of “pass” on the final oral defense of the thesis.
- Met all deadline dates and requirements as set by the Graduate College

Master in Science in Biochemistry with a Concentration in Medicinal Chemistry

This Master's program is designed for students who have completed the Bachelor of Science degree in a medicinal chemistry related field or professional program and want to improve their background in chemistry and biochemistry before entering schools of medicine, pharmacy and other health sciences. Emphasis is on organic chemistry, inorganic chemistry, and biochemistry with research encompassing chemical-biological relationships, mainly the relationship between molecular structure and biological activity or mode of action. It includes, but is not limited to the following:

- Design, synthesis, and biological evaluation of novel biologically active compounds and/or diagnostic agents.
- Molecular modifications of reported series that lead to a significantly improved understanding of their structure-activity relationships (SAR). Routine extensions of existing series that do not utilize novel chemical or biological approaches or do not add significantly to a basic understanding of the SAR of the series will normally not be accepted for publication.
- Molecular biological studies (e.g., site-directed mutagenesis) of macromolecular targets that lead to an improved understanding of molecular recognition.
- Structural biological studies (X-ray, NMR, CD, etc.) of relevant ligands and targets with the aim of investigating molecular recognition processes in the action of biologically active compounds.
- Molecular modeling and QSAR studies that provide fresh insight into the SAR of series that are of current general interest.
- Computational chemistry methods with demonstrated value for the identification or optimization of bioactive molecules.
- Effect of molecular structure on the distribution, pharmacokinetics, and metabolic transformation of biologically active compounds.

The department has established collaborations with researchers from the Mayo Clinic and the Barrow Neurological Institute to expand opportunities for seminars and mentoring.

Program Fees

Please note that there is a \$300 Program Fee per semester for all students enrolled in Biochemistry M.S. Programs.

Financial Support

Students enrolled in the M.S. degree in Biochemistry with a Concentration in Medicinal Chemistry are not typically appointed as a Graduate Teaching Assistant due to the design of the program (i.e. they are not granted financial support for their graduate studies). However; they may be considered for such an appointment upon request of the student and with the support and approval of their Research Advisor - dependent on department need.

Students funded by the department or university may not hold additional employment of any kind

Duration of Program

The Master's Degree can be completed in two years; however, more time may be needed depending on the research project. According to the Graduate College requirements, the Master's degree must be

completed within six consecutive years – continuous enrollment in all Fall and Spring semesters is required. The count begins from the first semester of admission to the student’s program.

Outline of Time in Program

Minimum Requirements for the M.S. Program in Biochemistry with a Concentration in Medicinal Chemistry – 30 semester hours and a non-thesis research paper

Beginning of first semester: Student chooses Research Advisor
and Members of the Supervisory Committee

End of first semester Complete Interactive Plan of Study

Student completes required course work and research and writes research paper

3-6 Months Prior to – presenting research paper Technical Review with Supervisory Committee

Notify the Graduate Programs Coordinator of the date of the presentation of the final research paper to the Supervisory Committee so the necessary paperwork can be completed.

Defend a written research paper to his/her Supervisory Committee

Make revisions to research paper if needed

Submit a copy of the final research paper to the Graduate Programs Coordinator for department files

Submit “Report of Final Master’s Culminating Experience” form signed by the Supervisory Committee to the Graduate Programs Coordinator

Course Requirements

A minimum of 30 credit hours and an applied project

- CHM 535 Medicinal Chemistry (3 Credits)
- Three additional 500-level or above courses related to the area of medicinal chemistry (2-3 credit hours each).
 - One 400-level course may be substituted if it is determined by the faculty advisor to be appropriate. (2-3 credit hours)
- Four credit hours CHM/BCH 501 – CHM/BCH 591 Department Seminars (Not CHM 501 New Student Seminar) 1 credit hour each. Any combination of the CHM/BCH 591 and CHM/BCH 501 can be taken to meet the total of 4 credit hours of seminar
- Six credit hours of BCH 592 Research (6 total credit hours)
- Two Credit hours of CHM/BCH 593 – Applied Project – To be taken as a capstone course

A cumulative GPA of 3.0 or better must be maintained on a yearly basis

Extracurricular Courses

Students interested in taking courses in addition to those included in their plan of studies should obtain authorization from their research advisors regardless of the student’s source of financial support. This also includes classes outside their field of study (e.g. business, languages, religion, art, recreation, etc) Authorizations are required for each course, and should be sent to the Graduate Programs Coordinator. Students that enroll in extracurricular courses without approval are subject to loss of financial support from the advisor and/or the department.

Transfer Courses

Courses taken as a non-degree graduate student at ASU or at another university in the US or Canada **that have not been counted toward a previous degree** may be used toward the required number of courses and total semester hours needed for the M.S. degree with the approval of the Graduate Programs Committee. The courses must have been completed within three years prior to the admission to the student's current program. A maximum of two courses may be used toward the four required courses for the Master's Program. A minimum of two 500 level courses must be taken at Arizona State University. The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript (original transcript must be on file at the Graduate College) showing the final grade for the course(s) and a written request to the Graduate Programs Coordinator who will present it to the Graduate Programs Committee. The student will be sent an email informing him/her of the committee's decision and instructions on how to proceed if the courses are approved.

Scholastic Requirements

The required GPA is 3.0 and is monitored on a yearly basis. If a student's GPA falls below 2.0, the Graduate Programs Committee may ask the Department Chair to write a letter to the Graduate College recommending immediate dismissal from the student's current graduate program. Lack of progress in research is determined by the Research Advisor and is reported to the Graduate Programs Committee. An appointment will be made for the student to meet with a member of the Graduate Programs Committee to explain the circumstances for the deficiency. The committee member will discuss this meeting with other members of the committee and the student will be sent an email or letter reviewing the deficiency and what must be done to relieve the deficiency within a specified time period. Consequences of unsatisfactory performance are discussed in the Program Deficiencies section of this manual and may include the following recommendations:

- The student is placed on departmental academic probation until the deficiency is remedied
- Student is advised to find a different Research Advisor
- Student is advised to change the degree of program
- Recommendation that the student be dismissed from the program

Program Progression

Selecting a Research Advisor and Supervisory Committee

Students select an advisor from a specified list of tenured or tenure-track faculty from the Chemistry and Biochemistry Programs (See Appendix E). Research Advisors must be selected by the end of the first semester in the program. A Co-Advisor and Members of the Supervisory Committee may be selected from the list of faculty or researchers from the Mayo Clinic and the Barrow's Neurological Institute or as specified in the *Supervisory Committee* section of this manual. Members of the Supervisory Committee must be selected by the end of the second semester. Only one Member of the Supervisory Committee, the Chair, needs to be a tenured or tenure-track faculty member from the Department of Chemistry and Biochemistry selected from the list provided. (See Appendix F)

Students are required to join a research group and form a Supervisory Committee by the end of the first semester. (See procedures in selecting a Research Advisor and Supervisory Committee described earlier in this document.) Students who have not made a selection should contact The Graduate Programs Coordinator to discuss the circumstances as to why this requirement was not met. Based on the discussion, a meeting with the Graduate Programs Committee Chair may be scheduled or the student may be required to write a formal petition to the Graduate Programs Committee. Students who do not follow this procedure are not progressing in their program satisfactorily and will be reported to the Graduate Programs Committee. Based on the committee's decision, the student will receive an email or letter specifying a time period that the requirement must be met. Consequences for not completing the requirement are presented in the *Program Deficiencies* section of this manual.

Interactive Plan of Study

The Interactive Plan of Study, as described in the *Program Structure* section, should be completed by the end of the first semester in residency.

Applied Project

The culminating experience is an applied project in the area of medical chemistry in which the student is required to prepare and defend a written research paper to his/her supervisory committee. This paper must be an original research paper written in publishable format by the student. There are two options.

- A. The research paper on the applied project must be at least 50 pages in length, double-spaced and typed in a 12 point font. The 50 page length can include the abstract, references list, and any tables or figures.

OR

- B. The document can consist of a published, peer-reviewed, first-authored article in a scientific journal. (A conference proceedings paper CANNOT be used.) This article should be submitted with a 10-12 page introduction, summary and discussion.

Students who choose this option must show proof of publication or acceptance of the article.

Apply for Graduation

The Graduate College has firm deadlines which are posted on their web page:

<http://www.asu.edu/graduate/generalinfo/GradDdlns/index.html>. Students who are nearing graduation should refer to this website to verify dates. The application can be found at:

<http://www.asu.edu/registrar/forms/pdf/mailapp.pdf>. Students take the completed graduation application to the Cashiers office, located on the second floor of the Student Services Building, to pay the fee and then submit the form and their receipt to the Graduation Office (Registrar's Office) on the first floor.

Schedule Presentation of the Applied Project

Students contact the members of their Supervisory committee to determine the best date for the presentation of the Applied Project. When the date and time is established, a conference room should be reserved. Conference rooms on the first floor of the Physical Science building are reserved in the main office – PS D 102. An email must be sent to the Graduate Programs Coordinator with the time and date of the exam so the “Report of Final Master’s Culminating Experience” form can be prepared and sent to the Research Advisor.

Documentation of the Completion of Degree Requirements

The Student completes any necessary revisions to the applied project and the Supervisory Committee signs the “Report of Final Master’s Culminating Experience” form indicating that the student has “passed” the applied project requirement. The form is then submitted to the Graduate Programs Coordinator to obtain the final signature from the Department Chair and submission to the Graduate College.

The Awarding of the Degree

The degree is awarded when the student has accomplished the following:

- Satisfactorily completed required coursework with a cumulative GPA of 3.0
- Conducted research at ASU under the direction of a tenured or tenure-track faculty member in the Department of Chemistry and Biochemistry
- Successfully presented and received a grade of “pass” on the final master’s culminating experience
- Meet all deadline dates and requirements as set by the Graduate College

Doctor of Philosophy in Chemistry

Doctor of Philosophy in Biochemistry

Minimum Requirements for the Ph.D. Program in Chemistry and Biochemistry – 84 semester hours and a Ph.D. dissertation

End of first semester:	Student chooses Research Advisor
End of second semester:	Student chooses Supervisory Committee members
	Student chooses Comprehensive Examination Committee member
	Graduate Programs Committee assigns Comprehensive Examination Committee Chair
	Complete Interactive Plan of Study
Third Semester	Optional technical review for the Comprehensive Examination with Supervisory Committee to review research project – strongly recommended
Fourth Semester	Student completes at least four 500 level courses and schedules Comprehensive Examination – The examination should be taken no later than March 15 of the second year for students entering in the Fall Semester or October 15 of the second year for students who entered the program in the Spring Semester.

Pass – Advanced to Candidacy



Fail – Drop to M.S., Drop to M.N.S or Leave without a degree.

Student completes required course work, research project and writes dissertation

6-9 Months Prior to
Dissertation Defense Technical Review with Supervisory Committee

Attend information meeting presented by the Graduate College given at the beginning of the Fall and Spring Semesters concerning formatting of the dissertation and graduation procedures.

Apply for Graduation by date given by the Graduate College

Submit dissertation for format review and schedule Final Defense to Graduate College – 10 Day Rule

Complete Survey of Earned Doctorates

Submit dissertation title, abstract, publications, names of Dissertation Committee (Supervisory Committee) and logistics of final defense to the Graduate Programs Coordinator

Defend dissertation

Make revisions to dissertation if needed

Submit dissertation defense paperwork to Graduate Programs Coordinator
(Coordinator will submit the form to the Graduate College for Dean's Signature)

Pick up "Announcement and Report for Doctoral Dissertation Defense" form from Graduate College and submit two copies of the dissertation for binding – Five bound copies required: two for the university library, one for the Research Advisor, one for the department and one for the student.

Duration of Program

Students in the Ph.D. degree programs typically take four to five years to complete the program. The M.S. degree is not a prerequisite for the Ph.D. program; however, students who enter the Ph.D. program with a previously earned M.S. degree in Chemistry or Biochemistry may possibly complete their program in three to four years if they have achieved exceptional research accomplishments. The Ph.D. degree must

be completed within five years after passing the Comprehensive Examination or the maximum of ten consecutive years from the time of initial enrollment – whichever is shortest.

Supervisory Committee

The Supervisory Committee consists of at least three members: the student's Research Advisor, who is the student's main mentor, and at least two additional Chemistry and Biochemistry tenured or tenure track faculty members. The Research Advisor is the Chair of the Supervisory Committee.

The Graduate Faculty model at ASU allows PhD programs to expand their PhD faculty membership to include faculty from other programs provided that they have the appropriate expertise. The Members of the Chemistry and Biochemistry Graduate Faculty are listed online at <http://graduate.asu.edu/gradfaculty>. This list includes all members of the Chemistry and Biochemistry Programs and some faculty from other programs. Some of these additional faculty may not be endorsed to chair, so students should always check with the Graduate Programs Coordinator.

Who can serve as Research Advisor, i.e. Chair of the Supervisory Committee?

- The Research Advisor must be selected from the Chemistry and Biochemistry Graduate Faculty. A complete listing of the faculty members can be found on the Graduate College website at: <http://graduate.asu.edu/gradfaculty/results>. Biochemistry Graduate Faculty members are listed first, followed by the Chemistry Graduate Faculty Members.
 - All faculty of the Chemistry and Biochemistry Programs are endorsed to chair.
 - Most, but not all members of the Chemistry and Biochemistry Graduate Faculty are endorsed to chair. Students should always check with the Graduate Programs Coordinator.

Who can serve as Research co-Advisor (optional)?

- Members on the Chemistry and Biochemistry Graduate Faculty who are endorsed to chair may serve as Co-Advisors.
- Other tenured or tenure-track faculty members from a science-related field or engineering may serve as co-advisors with approval from the Graduate Programs Committee and the Graduate College.
- Emeritus faculty
- Non-tenure-track faculty members, research professionals or non-ASU professors or researchers may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. (Student should see the Graduate Programs Coordinator)

Who can serve as a Supervisory Committee Member?

- Members of the Chemistry and Biochemistry Graduate Faculty
- ASU tenured or tenure-track faculty members from a science-related field or engineering
- Emeritus faculty
- Non-tenure-track faculty members, research professionals or non-ASU professors or researchers may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. (Student should see the Graduate Programs Coordinator)

The Supervisory Committee serves as the Dissertation Committee for Ph.D. students. Additional faculty or researchers can be added to the committee after the Program of Study and/or the Comprehensive Examination has been completed. Students, who want to add an additional Member, should see the Graduate Programs Coordinator.

Supervisory Committee Member Summary: (See Appendix G)

The Chair of the Supervisory Committee must be selected from the Chemistry or Biochemistry Graduate Faculty. Members can be Chemistry/Biochemistry Graduate Faculty, Emeritus ASU faculty or a tenured or tenure-track faculty member in a science-related field or engineering with the approval of the Graduate Programs Committee. A non-ASU professor or researcher may serve as a Member with approval from

the Graduate Programs Committee and the Graduate College. Students can have more than three Members (including the Chair) but not less than three. **At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the Department of Chemistry and Biochemistry.**

Comprehensive Examination Committee

This committee determines if the student is able to integrate his/her knowledge in chemistry and/or biochemistry with his/her current or future research and has the potential to continue to achieve the level of performance expected of a PhD candidate. The student's Research Advisor is not a member of the Comprehensive Examination Committee. Committee members consist of the remaining members of the Supervisory Committee, an additional faculty member selected by the student in conjunction with his/her Research Advisor and a faculty member assigned by the Graduate Programs Committee.

This committee is made up of:

- Chair – Assigned by the Graduate Programs Committee
- Members of the Supervisory Committee (not the Chair or Co-Chair of the Supervisory Committee)
- A third faculty member selected by the student in agreement with the advisor
 - Chemistry/Biochemistry Graduate Faculty Member
 - ASU tenured or tenure-track faculty member outside the department from a science related field or engineering
- An additional Member may be added – not required
 - Chemistry/Biochemistry Graduate Faculty Member
 - ASU tenured or tenure-track faculty member outside the department from a science related field or engineering
 - ASU Emeritus faculty
 - Non-tenure-track faculty, research professional, non ASU professor or researcher with approval of the Graduate Programs Committee.

Comprehensive Examination Committee Member Summary: (See Appendix H)

The Chair of the Comprehensive Examination Committee must be a Chemistry/Biochemistry Graduate Faculty Member and is assigned by the Graduate Programs Committee. Members include the Members (not the Chair or Co-Chair) of the Supervisory Committee and a faculty member selected in agreement with his/her advisor to serve on the Comprehensive Examination Committee. This Member can be a Chemistry/Biochemistry Graduate Faculty Member or a tenured or tenure-track faculty member in a science-related or engineering field. An additional Member can be added, but is not required. This Member can be a Chemistry/Biochemistry Graduate Faculty Member or a tenured or tenure-track faculty in a science-related or engineering field or, with approval from the Graduate Programs Committee, can be a non-tenure-track faculty member, research professional or non ASU professor or researcher.

Course Requirements

- Six 500 level courses related to the student's research (2-3 credit hours each)
 - Two of the six courses may be taken outside the Department of Chemistry and Biochemistry, but must be related to the student's research. (2-3 credit hours each)
 - A maximum of two 400 level course may be substituted for two of the six required 500 level courses. 400 level courses can only be taken with approval of the research advisor or mentor. (2-3 credit hours each)
 - CHM 498, Chemical Terminology for International Students, and CHM/BCH 590 cannot be used as one of the course requirements, but can be used toward the total 30 semester hours
 - Four 500 level courses must be completed before taking the oral exam
- CHM 501 New Student Seminar for students entering in the Fall Semester

- CHM/BCH 501 each semester enrolled in the program (up to 8 semesters required)
- Research (CHM/BCH 792) **is required for every semester** the student is involved in research
- 12 semester credit hours of Dissertation (CHM/BCH 799).

Note on Courses:

Students can take more than one 501 seminar per semester, but only one per semester is counted toward the total required.

The Graduate Program Committee does not recommend taking more than two classes in addition to the 501 seminar for each semester, so as to allow enough time for research. However, the student should discuss these recommendations with his/her Research Advisor.

A cumulative GPA of 3.0 or better must be maintained on a yearly basis

Transfer Courses

Students enrolled in a Ph.D. Program who have completed a master's degree in a science related field may submit a request to the Graduate Programs Committee for permission to transfer 30 credit hours toward the Ph.D. degree. Transfer credits will count toward the 84 total credit hours required **but not** toward the six required courses. Students with a M.S. degree from a university in the United States or Canada may submit a request to the Graduate Programs Committee to reduce the number of required courses from six to four. The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript (original transcript must be on file at the Graduate College) showing the final grade for the course(s) and a written request to the Graduate Programs Coordinator who will present it to the Graduate Programs Committee. The student will be sent an email informing him/her of the committee's decision and instructions on how to proceed if the request is approved.

Courses taken as a non-degree student or at another university in the US or Canada **that have not been counted toward a previous degree** may be used toward the required number of courses and total semester hours needed for the PhD degree. The courses must have been taken within three years prior to the initial enrollment in the students current Ph.D. Program. A maximum of 3 courses may be transferred for the PhD program. A minimum of three 500 level courses must be taken at Arizona State University. The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript showing the final grade for the course(s) and a written request to the Graduate Programs Coordinator who will present it to the Graduate Programs Committee. The student will be sent an email informing him/her of the committee's decision and instructions on how to proceed if the courses are approved.

Extracurricular Courses

Students interested in taking courses in addition to those included in their plan of studies should obtain authorization from their research advisors regardless of the student's source of financial support. This also includes classes outside their field of study (e.g. business, languages, religion, art, recreation, etc) Authorizations are required for each course, and should be sent to the Graduate Programs Coordinator. Students that enroll in extracurricular courses without approval are subject to loss of financial support from the advisor and/or the department.

Scholastic Requirements

The required GPA is 3.0 and is monitored on a yearly basis.. A student whose GPA drops below 3.0 is not considered to be progressing satisfactorily in his/her program. Lack of progress in research is determined by the Research Advisor and is reported to the Graduate Programs Committee. An appointment will be made for the student to meet with a member of the Graduate Programs Committee to explain the circumstances for the deficiency. The committee member will discuss the results of this meeting with the committee and the student will be sent an email or letter reviewing the deficiency and what must be done to meet the specified requirements within a specified time period. Consequences of unsatisfactory

performance are discussed in the *Program Deficiencies* section of this manual and may include the following recommendations:

- The student is placed on departmental academic probation until the deficiency is remedied
- The student is advised to find a different Research Advisor
- The student is advised to change the degree of program
- Recommendation that the student be dismissed from the program

However, if a student's GPA falls below 2.0 at the end of any semester, the Graduate Programs Committee may ask the Department Chair to write a letter to the Graduate College recommending immediate dismissal from the student's current graduate program

Program Progression

Selecting a Research Advisor and Supervisory Committee

Students are required to join a research group by the end of their first semester and form a Supervisory Committee by the end of the second semester. (See procedures in selecting a research advisor and Supervisory Committee described earlier in this section.) Students who have not made a selection should contact The Graduate Programs Coordinator to discuss the circumstances as to why this requirement was not met. Based on the discussion, a meeting with the Graduate Programs Committee Chair may be scheduled or the student may be required to write a formal petition to the Graduate Programs Committee. Students who do not follow this procedure and/or continue to enroll in courses when the requirement has not been met are not progressing in their program satisfactorily and will be reported to the Graduate Programs Committee. Based on the committee's decision, the student will receive an email or letter specifying a time period by which the requirement must be met. Consequences for not completing the requirement are presented in the *Program Deficiencies* section of this manual.

Selecting a Comprehensive Examination Committee

In addition to the Supervisory Committee, Ph.D. students must also have a Comprehensive Examination Committee by the end of the second semester. (See procedures in selecting a research advisor and Supervisory Committee described earlier in this section.) This committee has the responsibility to evaluate the student's progress in his/her program to determine if the student has the basis needed to continue research on a Ph.D. level and to approve the dissertation proposal. Upon successful completion of the exam, the committee makes a recommendation to the Graduate College to admit the student to *Candidacy* to the Ph.D. degree. Admission to doctoral candidacy verifies that the student has met the necessary requirements needed to continue the research initiated and complete the dissertation.

Interactive Plan of Study

The Interactive Program of Study, as described in the *Program Structure*, should be completed by the end of their second semester in residency.

Comprehensive Examination Technical Review – Optional

Students are encouraged to meet with their Supervisory Committee for a Comprehensive Examination Technical Review. This is not a formal report or exam - nor is it graded. The student gives a 20 minute presentation of his/her research followed by a discussion or question/answer session. This review gives the student an opportunity to present his/her research prior the Comprehensive Examination and receive feedback from the committee to determine if the student has enough research background for the Comprehensive Examination. There is no pass/fail score. It is suggested that the review be held the beginning of the student's third semester.

Comprehensive Examination

All students in the Ph.D. Programs must take the Comprehensive Examination to demonstrate their ability to integrate their knowledge of their research area and their potential to achieve the level of performance expected of a Ph.D. candidate in chemistry and/or biochemistry. The examination is administered by the Comprehensive Examination Committee in the fourth semester of residency in the program. Students who began in the Fall Semester must complete their exam **by March 15 of their second year**. Students who began in the Spring Semester must complete the exam by **October 15 of their second year**. **The examination can not be scheduled during the summer months**. Students must have completed at least four 500 level courses and four CHM/BCH 501 seminars before taking the exam.

The Comprehensive Examination consists of a written and oral component. The written portion is completed first and consists of two distinct reports on: 1) research completed by the student and 2) a proposal on an original research project. ***The written research report and research proposal must be given to all members of the committee for review at least two weeks before the oral portion of the examination. No reports will be accepted after this date. If the date is missed, the oral portion of the Comprehensive Examination may need to be rescheduled and the student may be put on department academic probation.*** The oral portion of the examination, referred to as the “oral examination” is a two hour examination in which the student presents and defends his/her current research project and the original research proposal.

Students contact each member of their Comprehensive Examination Committee to find a time convenient when all members can meet for the “oral examination”. It is the student’s responsibility to reserve a conference room and he/she must notify the Graduate Programs Coordinator with the date, time and place for the “oral examination”. The Graduate Programs Coordinator prepares the necessary documents and emails them to the Chair of the committee.

Written Part of the Comprehensive Examination

Preparation of the written research report and the original research proposal must adhere closely to the guidelines given below:

1) Academic Dishonesty

Using another's words, ideas, materials or work without properly acknowledging and documenting the source constitutes plagiarism. This includes materials taken from books, websites, journals, grant proposals, etc. Plagiarism will not be tolerated and will be sufficient cause for failing the examination. The Graduate Programs Committee may decide to take further actions, including reporting the student to the Graduate College with a recommendation for dismissal from the program.

2) English Language

Reports should be written in good English. Students with weak writing skills are encouraged to visit the Writing Center (<http://studentsuccess.asu.edu/writing>) for support.

3) Written Research Report

Should introduce the research project and describe the research accomplished by the student thus far. The report should be detailed enough to present the data in a coherent, clear and understandable fashion. An abstract, not to exceed one double-spaced page, should be prepared, stating the reasons for the work, the significant results, and the main conclusions. The length of the report, not including the abstract, must not exceed 10-15

double-spaced pages (12-point) including references, graphs, tables and figures. Figures must be included in the text. Students should use articles from journals of the American Chemical Society (e.g. *JACS*, *Biochemistry*, *JPC*, *JOC*, *Analytical Chemistry*) as a reference in the preparation of this report. Reports that do not follow these guidelines may be considered unsatisfactory.

4) Written Original Research Proposal

This report should comprise of the student's ***original research idea on a topic completely independent*** of the research project. The student must prepare a one-page abstract of the research proposal, with the research report abstract attached, and distribute it to the Oral Committee for approval prior to writing the detailed research proposal. This should be done ***at least 6 weeks*** prior to the oral portion of the exam.

The research proposal should contain the following four distinct parts, should be presented in the following order, and should not extend 12 double spaced pages (12 point, excluding the abstract), including tables, references and figures:

- a. Specific aims: In one-half page or less, a statement should present what the proposed research intends to accomplish.
- b. Background: This section should summarize the current state of knowledge in the area, and include a short literature review and some of the remaining challenges/open questions.
- c. Significance: This section should convincingly present the importance of the research to be undertaken.
- d. Project Execution: The proposed experimental setup, the process of collecting data and obtaining results should be presented here.
- e. Interpretation and Discussion: The analysis and interpretation of experimental results should be discussed in the context of the literature.

Oral Part of the Comprehensive Examination - "Oral Examination"

During the oral part of the Comprehensive Examination, ("oral examination"), students are questioned in several areas relevant to their development as professional scientists. The successful candidate must clearly demonstrate:

- Mastery of basic concepts of chemistry/biochemistry
- Proficiency in the laboratory, as evidenced by the progress and productivity level achieved in research, including the ability to interpret data, draw conclusions and relate them to what has been established in the literature.
- An ability to read and comprehend the chemical literature concerning areas not directly related to the student's own research.

The examination is divided into two oral presentations: 1) presentation of the student's current research project and 2) presentation of the proposal of an original research topic. Following or during each presentation, the Comprehensive Examination Committee will ask the student detailed questions.

Results of the Comprehensive Examination

The Oral Examination Committee will make one of the following recommendations.

- 1) Pass – with recommendation to admit to candidacy for the Ph.D. degree. If minor deficiencies have been identified in the written or oral part of the Comprehensive Examination, the committee may ask the student to make revisions and/or meet additional requirements/conditions. The student is considered to have “passed” the examination only after all requirements/conditions have been met as determined by the Chair of the Comprehensive Examination Committee.
- 2) Fail - with one of the following possibilities:
 - a) Drop to the M.S. degree
 - b) Drop to the Masters of Natural Science degree (See Graduate Programs Coordinator)
 - c) Leave the Chemistry/Biochemistry Program without a degree.

Please note: Students who have been in a Chemistry/Biochemistry PhD Program for more than two years and decide to drop to a Chemistry/Biochemistry Master's Program will be given an additional two semesters of financial support to complete their Master's Program. The student must maintain satisfactory academic progress and TA evaluations for every semester enrolled in the program. Students who need more than the additional two semesters to complete their degree requirements may petition the Graduate Programs Committee for additional support. The Graduate Programs Coordinator can assist students with this process.

Documentation of Comprehensive Examination Results

Examination Successfully Completed: Within ten days of the exam, the Comprehensive Examination Committee Chair must submit the Graduate College form, “**Report of Doctoral Comprehensive Examinations and Approval of the PhD Dissertation Prospectus**”, to the Graduate Coordinator. Sections to be completed include:

- **Part III** Signatures of the *Oral* Committee
- The date of the exam reflects the date when *all* requirements for the exam were completed and the grade of “pass” was received
- **Part V** Signatures of the *Dissertation* Committee (Supervisory Committee) for the Approval for the PhD Dissertation Prospectus

The Graduate Coordinator will obtain the signature of the Department Chair and submit it to the Graduate College. The student will receive written notification from the Graduation Office indicating their official candidacy for the Ph.D. degree.

Examinations Requiring Revision: If the Comprehensive Examination Committee decides that minor revisions must be completed before the outcome of the Comprehensive Examination can be determined, the Committee Chair needs to do the following:

- Complete the departmental form “**Department of Chemistry and Biochemistry Oral/Written Comprehensive Examination Report**” and write a summary of the revisions to be made/and or the requirements to be met with a date that the requirement(s) need to be completed.
- Submit the form and the summary to the Graduate Coordinator within 10 days of the exam. The student should also receive a copy of the summary.
- The Coordinator will contact the student to verify that he/she has the information.
- The Coordinator will prepare a new Graduate College Form for the final completion of the exam. If the student completes the exam prior to the due date, the Committee Chair should contact the Coordinator, so the correct completion date can be included on the form.

Requirements for the awarding of the Master's Degree in Passing

Students who have achieved advanced candidacy status in the Ph.D. Program in Chemistry or Biochemistry by passing the Doctoral Comprehensive Examination are eligible to apply for the Master's Degree in Passing (MIP). Students who hold an M.S. in Chemistry degree from a regionally accredited U.S. institution or equivalent are eligible to apply for the master's degree in passing only if no credit

hours from this previously awarded degree have been counted towards the minimum credit hour requirement of the Ph.D. in Chemistry (currently 84 credit hours). Those who already hold an M.S. in Chemistry degree from Arizona State University are not eligible to apply.

1. Successful completion of the oral and written parts of the Doctoral Comprehensive Examination required for all Ph.D. students in Chemistry.
2. The program of study for the Master's degree must include at least four 500 level courses (2 or 3 credits each), four CHM/BCH 501 seminars (1 credit each), and 14 credits of CHM 792 research. For the awarding of the master's degree, students must meet the requirements of the Graduate College.
3. Prepare and successfully defend a written research portfolio to his/her supervisory committee. This portfolio must be an original research paper written by the student. There are two options.
 - a. The portfolio must be at least 50 pages in length, double-spaced and typed in a 12 point font. The 50 page length can include the abstract, references list, and any tables or figures.
 - b. OR, the portfolio can consist of a published, peer-reviewed, first-authored article in a scientific journal. (A conference proceedings paper can NOT be used.) This article should be submitted with a 10-12 page introduction, summary and discussion. Students who choose this option must show proof of publication or acceptance of the article.
4. The minimum time frame between the completion of the Master's Degree in Passing and the Final Doctoral Dissertation Defense should be at least one year. (Exceptions can be made on a case by case basis by a petition to the Graduate Programs committee.)

Paperwork Process for Applying for the Master's Degree in Passing

1. Students should submit a copy of their research portfolio to their Research Advisor six (6) weeks prior to the research portfolio defense for his/her advisor to review. The Supervisory Committee should receive a copy two (2) weeks before the defense.
2. The student presents and defends the Research Portfolio to his/her Supervisory Committee.
3. Committee Members sign the Department MIP form (found on the Department website). The form will be signed by the advisor and supervisory committee only after the successful defense of the research portfolio and after all revisions have been made to the satisfaction of all Committee Members.
4. The signed and completed Master's Degree in Passing department form and a final copy of the completed research portfolio must be submitted to the Graduate Programs Coordinator. The Graduate Programs Coordinator will contact the Graduate College and request a Master's in Passing Program of Study be created for the student.
5. The Graduate College will prepare an iPOS for the MIP and send an email to the student when the iPOS is available.
6. After the student has completed and submitted the iPOS, he/she needs to apply for the Master's Graduation by completing the Graduation Application found on the Registrar's website and paying the fee at the Cashier's Office on the second floor of the Student Services Building. This must be completed before the deadline date to submit graduation applications set by the Graduate College.

Technical Review of the Dissertation

6-9 months prior to the dissertation defense, the student is required to schedule a Technical Review with his or her Supervisory Committee in which the student's progress is assessed. The student should prepare a 20 minute presentation on his/her research progress, and discuss any manuscripts in preparation. The committee will question and advise the student to guide him/her in the completion of his/her defense.

Dissertation

The basic requirement for the Ph.D. degree is for the candidate to demonstrate his/her competence to conduct independent, original research. The major research effort of the candidate will be embodied in the dissertation presented for the Ph.D. degree. In order for the dissertation to be acceptable, it must contain new and unique contributions to scientific knowledge, publishable in primary research journals. The student must have a least one (1) first-author published paper in a refereed journal prior to graduation.

The format of the dissertation must follow the Graduate College guidelines (www.asu.edu/graduate/formatmanual). Examples of the Ph.D. dissertation are available from your research advisor and the Graduate Programs Coordinator.

Graduate College Information Meeting

The Graduate College presents a “Thesis/Dissertation and Graduation Seminar” at the beginning of Fall and Spring Semesters. Students are not required to attend; however, the information concerning formatting and graduation procedures is extremely helpful.

Apply for Graduation

The Graduate College has firm deadlines which are posted on their web page: <http://www.asu.edu/graduate/generalinfo/GradDdlns/index.html>. Students who are nearing graduation should refer to this website to verify dates. The application can be found at: <http://www.asu.edu/registrar/forms/pdf/mailapp.pdf>. Students take the completed graduation application to the Cashiers office, located on the second floor of the Student Services Building, to pay the fee and then submit the form and their receipt to the Graduation Office (Registrar’s Office) on the first floor.

Schedule the Final Defense with the Supervisory Committee

Students contact the members of their Supervisory committee to determine the best date for the final defense. When the date and time is established, a conference room should be reserved. Conference rooms on the first floor of the Physical Science building are reserved in the main Chemistry/Biochemistry office – PS D 102.

Schedule of Defense Form and Format Review – 10 Day Rule

Two Graduate College forms are required to be completed before the final defense: “Doctoral Defense Schedule Form” and “Format Approval Sheet” (<http://www.asu.edu/graduate/forms/>). These completed forms and a copy of the dissertation must be submitted to the Graduate College at least 10 days before the final defense. If an article from a journal was used as a style guide, a copy of the article must also be submitted. Students will also be asked to complete the Survey of Earned Doctorates. The survey can be found on the web at: www.asu.edu/graduate/forms

Copy of the dissertation must be submitted to each member of the Supervisory Committee **at least one month** prior to the final oral examination.

Announcement of the Ph.D. Final Defense

The student’s final defense is open to all students, faculty and staff of Arizona State University. Announcements are sent by the department and the Graduate College. Five working days before the

defense, the student must email an abstract, list of publications and information concerning the logistics (date, time and place) and names of the committee members to the Graduate Programs Coordinator. The announcement is created and shown to the student for final approval. When the student approves the final draft, a paper copy and an electronic copy of the announcement is circulated to the faculty, students and staff in the Chemistry and Biochemistry Department. An electronic copy is also sent to departments with related research interests. The Graduate College submits information for the dissertation defense to be published in the ASU Insight

Dissertation Defense

The final defense of the dissertation must take place by the deadline date specified by Graduate College (<http://www.asu.edu/graduate/generalinfo/GradDdlns/index.html>). It consists of a formal oral presentation of the student's thesis, open to the public and approximately 45 minutes in length, followed by a closed session with the student and the Supervisory Committee.

Documentation of Final Dissertation Defense

When the student has passed the final dissertation defense, all members of his/her Supervisory Committee must sign the examination form provided by the Graduate College to the Chair of the committee. Section B of this form must be completed by the Supervisory Committee Chair (Research Advisor) indicating if revisions need to be made. When all revisions are completed, the Chair (Research Advisor) signs the bottom of the form – Section D verifying final approval of the dissertation document.

The form is submitted to the Graduate Programs Coordinator who obtains the signature of the Department Chair and hand delivers the document to the Graduate College for the Dean to sign. The Coordinator will email the student that the document was delivered and instruct the student to pick up the document from the Graduate College Office after a period of 24-48 hours. The student makes a copy of this form for each copy of the dissertation to be bound and submits all copies to the ASU Bookstore for binding.

Dissertation Binding

The student arranges for five bound copies of the thesis: two copies for the Hayden Library and Archives, one copy for the advisor, one for the department and one for the student.

The Awarding of the Degree

The degree is awarded when the student has accomplished the following:

- Satisfactorily completed required coursework with a cumulative GPA of 3.0
- Conducted research at ASU under the direction of a Chemistry/Biochemistry Graduate Faculty Member
- Successfully completed the Comprehensive Examination
- Written a dissertation approved by the Supervisory Committee
- Successfully presented and received a grade of “pass” on the dissertation defense
- Meet all deadline dates and requirements set by the Graduate College

Academic Standards

Students who meet program requirements as stated in each degree program description in this Student Handbook are considered to be in good academic standing. Students who are not able to fulfill a requirement by the timeline given need to submit a petition to the Graduate Programs Committee requesting an extension to complete the requirement. The petition must include the following information:

- Explain extenuating circumstances as to why the requirement cannot be met
- Present a plan and/or outline describing what has been done and will be done to get back on track
- Give the date(s) as to when the requirement will be completed
- Obtain a letter of support from the student's Research Advisor.

The petition in written form (can be done via email) is submitted to the Graduate Programs Coordinator who will put the petition on the agenda for the first available Graduate Programs Committee meeting. The petition can be expedited if extenuating circumstances exist. Students will be notified of the committee's decision by email or letter.

Results of Lack of Satisfactory Progress

Students who are not performing satisfactorily, as demonstrated by a GPA lower than that required for their program and/or are not meeting the time limits to meet program requirements will be sent a written notice from the Graduate Programs Coordinator on behalf of the Graduate Programs Committee explaining the deficiency and how it can be remedied. Based on the circumstances and the response from the student and his/her advisor, the student may be placed on Department Academic Probation, be given the option of changing to an alternative degree offered by the department or be dismissed from the program.

If a student's GPA falls below 2.0, the Graduate Programs Committee may ask the Department Chair to write a letter to the Graduate College recommending immediate dismissal from the student's current graduate program

Department Academic Probation is on the departmental level and is not reported to the Graduate College or put on a student's permanent academic record. The consequence of this probation affects eligibility for financial support from the department. Students on department academic probation are given a written notice with a specified time limit to improve academic performance and/or meet program requirements. As a result of not meeting the requirements, the department may not offer a Graduate Assistant position for future semesters.

The option of changing to a different degree program offered by the Department of Chemistry and Biochemistry may be advised by the Graduate Programs Committee. The student will be sent a written notification from the committee informing him/her that he/she has failed to meet their program requirements and provide information concerning an alternative program within the department that may be more appropriate for the student.

Program Dismissal occurs when a student has been given notice of poor performance and has not met the requirements given by GPC to remedy the deficiency within the time limit given. The Department Chair may write a letter to the Graduate College recommending that the student be dismissed from his/her academic program. The student will be sent a written notice by certified mail and given a period of 10 business days to request a meeting with the Graduate Programs Committee to discuss his/her situation prior to the submission of the Chair's letter to the Graduate College recommending the dismissal.

Changing Research Advisor and/or Committee Members

Research Advisor: Changing a Research Advisor is not encouraged, but if circumstances justify the need, it is a possibility. The student should first talk with the Research Advisor to see if the problems can be

resolved and discuss alternatives. If both agree that it is in the best interest of those concerned, a department "Change of Advisor" form (see Appendix I) should be completed and submitted to the Graduate Programs Coordinator for presentation to the Graduate Programs Committee.

Supervisory Committee Member: Except for the Chair of the Comprehensive Examination Committee and the Chair of the Dissertation Committee, Committee Members can be changed by writing a request to the Graduate Programs Committee explaining the change and providing the name of the new Member. This should be supported by the student's Research Advisor and a statement from the new member verifying that he/she accepts the role of member on the student's committee. The request is submitted to the Graduate Programs Coordinator to present to the Graduate Programs Committee.

After a change has been approved on the departmental level by the Graduate Programs Committee, be it for a new advisor (Supervisory Committee Chair) or a new Supervisory Committee Member, the student must request the change on his/her Program of Study. If the student completed an electronic POS, he/she can request the change through the ASU Interactive by selecting the POS option.

Comprehensive Examination Committee Member: A request to change the Chair of the Comprehensive Examination Committee is submitted to the Graduate Programs Committee and is only approved if extenuating circumstances occur. If approved, the Graduate Programs Committee appoints a new Chair – The new Chair is not selected by the student or the student's Research Advisor.

Absent Committee Member for the Final Defense

If a committee member is not be able to attend a final defense and all efforts of changing the time and date have not worked, the student should contact the Graduate Programs Coordinator as soon as possible. Please note that any and all changes to your Committee must be approved by the Graduate Programs Committee.

Responsibilities of Teaching Assistants

Graduate Teaching Assistants are assigned different roles depending on the qualifications of the individual, the needs of the department, and the funding available each semester. The time commitment is estimated to be approximately 20 hours per week for a full-time (50% FTE) position and the assignment may include any of the following listed responsibilities. If the assigned duties consistently exceed 20 hours per week, the student should contact the Chair of the Teaching Assistant Committee and/or Graduate Programs Committee.

General Chemistry

General Chemistry TAs are typically assigned to teach two 3 hour lab/discussion sections while also providing support for the lecture part of the course (the lab and lecture portions of the course are not separate courses as with other lab courses). Typical duties of a TA in this role include:

- Leading a 50-minute discussion period of lab procedures and course material
- Supervising guided inquiry lab experiments
- Enforcing safety policies
- Grading group lab reports and quizzes
- Writing quizzes
- Holding weekly office hours in the LRC
- Periodically attending lecture sessions
- Attending weekly staff meetings
- Maintaining course grades for ~48 students per semester
- Optional duties may apply, but should not consistently exceed the 20 hours per week limit

Organic Chemistry lab TAs are typically assigned to teach two 4 hour recitation/lab sections. Typical duties include:

- Leading a discussion of lab principles
- Supervising lab experiments
- Enforcing safety policies
- Grading lab reports
- Running laboratory instruments
- Holding weekly office hours
- Attending weekly staff meetings
- Maintaining course grades for ~40 students per semester

To minimize prep time, every possible attempt is made to assign TAs to two sections of the same class.

Graders

Courses with large enrollment (50+ students) and no associated lab sections are typically assigned TAs to help with course management and grading. Graders are typically assigned responsibility to multiple courses at once. Organic graders, for example, may be asked to assist with duties in many classes, including exam and lab report grading, development of materials, or running instrumentation. There are very few grading positions available and they are typically filled by TAs with special limitations (such as a physical handicap or language barrier) or TAs that have been assigned to only one section of a different course (to preclude them from teaching labs from two different courses). Please keep this in mind if you make a special request for this assignment.

Specialized Assignments

Additional TA assignments may be available in the following areas (depending on needs each semester).

- Assistant Lab Coordinators: provide support in running the General and Organic Chemistry lab program
- NMR Facilities TAs: provide instrument support in the MRRC and H-Wing instructional labs
- Setup TAs: assist with the setup of experiments (typically in the upper-division Labs)
- Stockroom TAs: assist in the general and/or organic stockrooms with the preparation of student lab materials

Very few individuals are qualified to fill these positions, so they are most often recruited by the General Chemistry Coordinator.

Teaching Assistant contacts and coordinators are listed on Appendix J.

Maternity Leave

It is a Graduate College requirement for all graduate students to be continuously enrolled every Fall and Spring Semester from the first semester of enrollment to the completion of their program. Therefore, a student must request a Maternity Leave of absence if the absence occurs during the academic year. The request must be approved by the Graduate College the semester *prior to* the semester of the leave. The student completes the Graduate College form, "Petition to the Graduate College", obtains the signatures of the Supervisory Committee and submits the form to the Graduate Programs Coordinator. The Coordinator will present the request to the Graduate Programs Committee, obtains the signature of the Chemistry and Biochemistry Programs Chair and delivers the request to the Graduate College for final approval.

According to ASU policy, graduate students with a Graduate Assistant appointment (FTE of .50 or more) who have completed at least one academic year's of service are eligible for up to six weeks of paid

maternity leave for the recovery of childbirth. The student must maintain a minimum of 6 credit hours during the semester the student is requesting the paid leave of absence. The amount of coverage within the six week period is affected by the dates of the appointment and students should contact the Benefits Office of Human Resources – Leaves and Disabilities with any questions.

Websites for information include

<http://www.asu.edu/provost/personnel/parentalleave-faq.html>

<http://www.asu.edu/aad/manuals/spp/spp705-02.html>

<http://www.asu.edu/aad/manuals/spp/spp708.html>

Forms to be completed and submitted to the Department of Chemistry and Biochemistry Business Office in PS D 106 include:

Request for Leave of Absence form –

<http://www.asu.edu/hr/benefits/forms/leaveofabsenceandhold.pdf>

Certification of Health Care Provider Completed by Doctor:

<http://www.asu.edu/hr/benefits/forms/certificationofhealthcareprovider.pdf>

The department must be notified within 48 hours of when the baby is born.

Because changes in the above procedure may occur, it is recommended that the student requesting the maternity leave meet with a staff member from the Chemistry and Biochemistry Business Office to discuss the process.

Registration – Late Registration and Add/Drop

Students who miss the deadline to register for classes or to add/drop a course should see the Graduate Programs Coordinator to complete the necessary paperwork.

A course that is dropped online past the deadline date may incur a grade of “W” on the student’s transcripts

Appendix A

Graduate Programs Committee

2008-2009

Chair

Rebekka Wachter rwachter@asu.edu (480)965-8188

Members

Marcia Levitus marcia.levitus@asu.edu (480) 727-8586

Ulrich Haussermann Ulrich.Haussermann@asu.edu (480) 727-0780

Robert Pettit bpettit@asu.edu (480) 965-3351

Anna Moore amoore@asu.edu (480)965-2953

Martha McDowell (staff) martha.mcdowell@asu.edu (480) 965-4664

Michelle Meighan mmeighan@asu.edu
Jeanette Nangreave Jeanette.Nangreave@asu.edu
(student rep)

2009-2010

(To Be Announced)

Chair

To Be Announced

Members

To Be Announced

Martha McDowell (staff) martha.mcdowell@asu.edu (480) 965-4664

Committee Selection

Please type or print clearly the names of the committee members on this form. Return completed form to the Graduate Coordinator in PSD 102-A

_____	_____	_____
Student's Name	ASU ID Number	Date
<input type="checkbox"/> MS Chemistry	<input type="checkbox"/> MS Biochemistry	<input type="checkbox"/> MS Natural Sciences
<input type="checkbox"/> MS Med Chem	<input type="checkbox"/> PhD Chemistry	<input type="checkbox"/> PhD Biochemistry

Research Advisor (Students must choose a research advisor by the end of their first semester. This person is the chair of the supervisory committee but NOT the oral exam committee)		
_____	_____	_____
Name	Signature	Date
_____	_____	_____
Co-Advisor (If Applicable)	Signature	Date

Supervisory and Oral Examination Committees (By the end of the first year, students must choose two tenure/tenure-track Chemistry & Biochemistry faculty members- these two faculty members will serve on both the supervisory and oral examination committees. One of these members can be from outside the Dept. of Chemistry.)		
_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date

Oral Examination Committee (In addition, students must choose one tenure/tenure-track Chemistry & Biochemistry faculty member to serve on the oral examination committee only)		
_____	_____	_____
Name	Signature	Date

Chair of Oral Examination Committee <i>FOR OFFICE USE ONLY - Assigned by the Graduate Program Committee!!!</i>	
_____	_____
Name	Date

Appendix C

Interactive Plan of Study (iPOS) Reference for Chemistry and Biochemistry Programs

The iPOS is an agreement between the student and the Department of Chemistry and Biochemistry, the College of Liberal Arts and Sciences and the Division of Graduate Studies stating the requirements needed for his/her degree. It is not sent to prospective employers nor does it affect the GPA.

While completing the iPOS, keep in mind that this is a “plan” for completing your program requirements and changes, most likely, will need to be made as you progress through your program. These changes are also entered by using the same iPOS links and procedures used for the original iPOS.

Students should discuss course requirements with their Research Advisor/Supervisory Committee and follow the guidelines stated in the Department of Chemistry and Biochemistry Graduate Programs Student Handbook – Requirements and Procedures (can be found on the Dept Website –Graduate Section).

PhD students are required to submit the iPOS the end of their second semester and no later than the beginning of the third semester in their program. It should include CHM/BCH 501 for each semester enrolled (up to eight semesters), at least six courses (2-3 credits each) as described in the department student handbook, twelve hours of Dissertation (BCH/CHM 799), and research hours for every semester in which research is performed (CHM/BCH 792). The total semester hours required is 84.

MS students are required to submit the iPOS at the end of their first semester and no later the beginning of the second semester in their program. It should include CHM/BCH 501 for each semester enrolled (up to four semesters), at least four courses (2-3 credits each) as described in the department student handbook, six hours of Thesis (CHM/BCH 599) and research hours for every semester in which research is performed (CHM/BCH 592). The total semester hours required is 30.

Courses completed from a university other than ASU, can be selected as transfer courses; however, they must be courses that were approved by the Graduate Programs Committee and an original transcript must be on file with the Graduate College.

Step by step Instructions for completing the iPOS are available in a PowerPoint presentation prepared by the Graduate College and will be sent to you by email from the department’s Graduate Coordinator. A link from the Graduate College website will be available in the future.

While completing the iPOS: Students may not know exactly what they will be taking in future semesters - That’s ok. You can look on the Registrar’s website for courses taught in previous semesters and if your Advisor agrees that the course would support your research, you can list the course. This is particularly true for the 598 Special Topics courses. Remember, you can make changes to the iPOS even after a course is taken. You may also need to change the number of research hours taken for a particular semester.

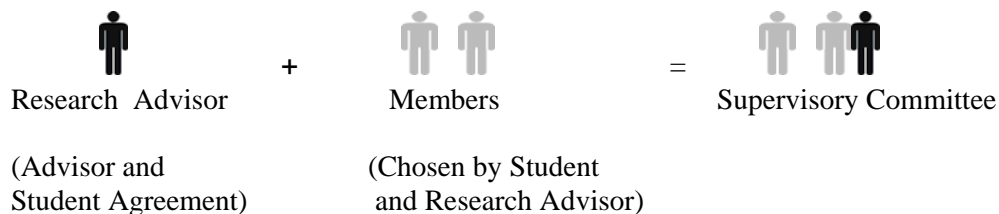
When the iPOS is complete:

- Students print the iPOS summary and the advisor signature form.
- Both the summary and the signed advisor form are submitted to the Graduate Programs Coordinator.
- The Graduate Programs Coordinator discusses the iPOS with the Department Chair or Associate Chair for review and if approved will forward it to the Graduation Office and Graduate College for processing and final approval.

When Changes are needed: If the change is for the number of research hours taken in a semester or for a change in the 501 seminar taken, the advisor does not need to sign. If it is a change in courses taken, print the signature form and ask the research advisor to sign it. You then submit the requested change and signed advisor form to the Graduate Coordinator.

M. S. Chemistry and Biochemistry Programs

Supervisory Committee



M.S. Program

The research advisor is the Chair of the Supervisory Committee. He/she should be a Member of the corresponding Graduate Program (i.e. a tenured or tenure-track faculty in the Department of Chemistry and/or Biochemistry). A list of the members of the chemistry and biochemistry programs is available at <http://chemistry.asu.edu/graduate/facultyResearch.asp>.

Members can be faculty of the Chemistry/Biochemistry Graduate Programs, Emeritus ASU faculty or a tenured or tenure-track faculty member in a science-related field or engineering with the approval of the Graduate Programs Committee. A non-ASU professor or researcher may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. Students can have more than three Members (including the Chair) but not less than three. **At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the Department of Chemistry and Biochemistry**

Appendix E
(3 Pages)

**Specified List of Faculty Participating in the
M.S. Biochemistry with a Concentration in Medicinal Chemistry**

Arizona State University Department of Chemistry and Biochemistry

<i>Faculty</i>	<i>Research Description</i>	<i>Contact Information</i>
James Allen	Structural properties of proteins involved in neurological diseases and cancer	jallen@asu.edu
John Chaput	Directed molecular evolution of medically relevant peptides, pre-symptomatic disease detection	john.chaput@asu.edu
Petra Fromme	Biophysical and structural studies of membrane proteins involved in human diseases, including proteins from HIV and proteins involved in transport and bio-energetics.	pfromme@asu.edu
Giovanna Ghirlanda	Design of novel peptide-based antiviral agents; structural and biophysical studies of natural anti-HIV proteins	gghirlanda@asu.edu
Anne Jones	Inorganic complexes in medicine	Anne.Katherine.Jones@asu.edu
Seth Rose	Design of anticancer drugs	srose@asu.edu
Ed Skibo	Rational cancer drug design	eskibo@asu.edu
Rebekka Wachter	Structural and molecular biological studies of macromolecular targets involved with molecular recognition, including tuberculosis protein factors implicated in MTB virulence.	rwachter@asu.edu
Peter Williams	Development of novel bioanalytical techniques for protein and nucleic acid characterization and applications to real-world problems	pw@asu.edu
Hao Yan	Self-assembly of DNA nanostructures, for nanotechnology and personalized medicine	hao.yan@asu.edu

Mayo Clinic Scottsdale:

Researchers:

- Joseph C. Loftus; PhD;
- Christopher A. Lipinski, MD;
- Daniel Riggs, PhD;
- James Allen, PhD (ASU);

- Michael C. Berens, PhD;
- Nhan Tran, PhD;
- Nathalie Meurice, PhD (TGen);
- Gary Flynn, PhD (BIO5)

Contact information: Christopher A. Lipinski, MD; Mayo Collaborative Research Building
Mayo Clinic Arizona; 13400 East Shea Blvd.; Scottsdale, AZ 85259; (480) 301-5653

Lipinski.Christopher@mayo.edu

Research Descripton: Glioblastoma multiforme (GBM) is the most common form of malignant brain tumor and is extraordinarily aggressive. Patients are typically diagnosed at younger ages than seen with other tumor types (mean ~50 years of age) and the average survival from diagnosis is approximately 1 year despite currently available therapy. The major pathobiological feature of GBM is invasion of tumor cells away from the central tumor mass. These cells are particularly problematic as they are not removed by surgical resection and are resistant to radiation and current chemotherapy. Our multidisciplinary group is comprised of clinicians, cancer biologists, molecular biologists, structural chemists, computational chemists, and medicinal chemists. The focus area of the group is on discovery of drugs which prevention of GBM cell invasion and as a potential result, sensitizing these cells to other cytotoxic strategies. These efforts have resulted in: (1) identification of a small molecule lead compound which targets a non-catalytic site of the pro-invasive kinase, Pyk2 and inhibits GBM cell migration, (2) generation of a biological molecule (monoclonal antibody) and single-chain variable fragment (scFv) which inhibit GBM cell migration, and (3) therapeutic inhibitory siRNAs. These therapeutic leads are currently advancing though preclinical evaluation and optimization stages of development.

Barrow Neurological Institute

Researchers:

- Dr Ronald J. Lukas, Ph.D. ,

Contact Information: Ronald J. Lukas, Ph.D, Senior Staff Scientist, Division of Neurobiology , Director, Laboratory of Neurochemistry : Barrow Neurological Institute , 350 West Thomas Road , Phoenix, Arizona 85013 . (602)-406-3399 ;

rlukas@chw.edu

<http://www.thebarrow.org> : research : basic research : neurochemistry

Research Description: The Lukas laboratory predominantly engages in studies of nicotinic acetylcholine receptors. These receptors play important roles throughout the brain and body in mediation of chemical signaling by the natural chemical messenger, acetylcholine. They also mediate effects of nicotine. Their broad physiological roles are matched by their suspected or known involvement in a variety of diseases, including Alzheimer's, schizophrenia, and epilepsy. Moreover, receptor responses to nicotine are involved in nicotine dependence and consequent tobacco-related diseases including cancers and vascular disorders. The laboratory is involved in nicotinic drug discovery efforts as well as in efforts to develop superior research tools for nicotinic receptor studies.

Midwestern University


- Dr. Hugo R. Arias
Associate Professor

Contact Information: Hugo R. Arias, Associate Professor, Department of Pharmaceutical Sciences, Midwestern University, 19555 N 59th Ave., Glendale, AZ 85308. Phone: (623)572-3589; FAX: (623) 857-3550; Email

Research Description:

Structural and functional characterization of nicotinic acetylcholine receptors.

The scientific interest of my laboratory is centered on the topological localization of binding sites and mechanisms of action for noncompetitive antagonists of potential medical interest in nicotinic acetylcholine receptors (AChRs), archetypes of the Cys-loop ligand-gated ion channel superfamily. These studies are of great importance for the understanding of the structure and functions of this receptor superfamily which mediates synaptic transmission in the nervous system and contributes to higher-order brain mechanisms such as learning and memory, as well as for the understanding of the origin of several neurological disorders including Alzheimer's disease, depression, and drug addiction, to name some of the most important diseases. More specifically, we are interested in determining the binding site locations and inhibitory mechanisms for structurally different antidepressants, for benzylidene-anabaseine derivatives (in clinical trial for the treatment of Alzheimer's disease- and schizophrenia-related dementias), and for ibogaine congeners (potential anti-addictive drugs), in muscle-type (e.g., *Torpedo* and mice AChRs) and neuronal-type AChRs (e.g., human $\alpha3\beta4$, human $\alpha7$, and human $\alpha4\beta2$ subtypes, each expressed in HEK293 cells), when the receptor is in different conformational states. To perform these studies we are using a combination of state-of-the-art approaches including state-dependent radioligand binding, structure-activity relationship studies, quantitative fluorescence spectroscopy, photoaffinity labeling, electrophysiology, structural modeling and molecular docking, and animal behavior in mutant mice.



Appendix F

M.S. in Biochemistry with a Concentration in Medicinal Chemistry

Supervisory Committee



The research advisor is the Chair of the Supervisory Committee. He/she should be a tenured/tenure-track faculty member of the Department of Chemistry and Biochemistry chosen from a specified list.

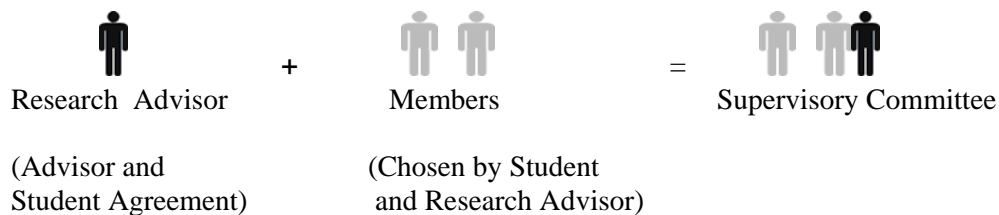
One member of the Supervisory Committee must be a tenured/tenure-track faculty member of the Department of Chemistry and Biochemistry. A co-advisor, the second member and any additional members can be an Emeritus ASU faculty member or ASU tenured/tenure-track faculty from the department or outside the department in a science related field or engineering with the approval of the Graduate Programs Committee. A non ASU professor or researcher may serve as a member with approval from the Graduate Programs Committee and the Graduate College.

Two members of the Supervisory Committee must be tenured or tenure-track faculty from the Department of Chemistry and Biochemistry.

Appendix G

Ph. D Chemistry and Biochemistry Programs

Supervisory Committee



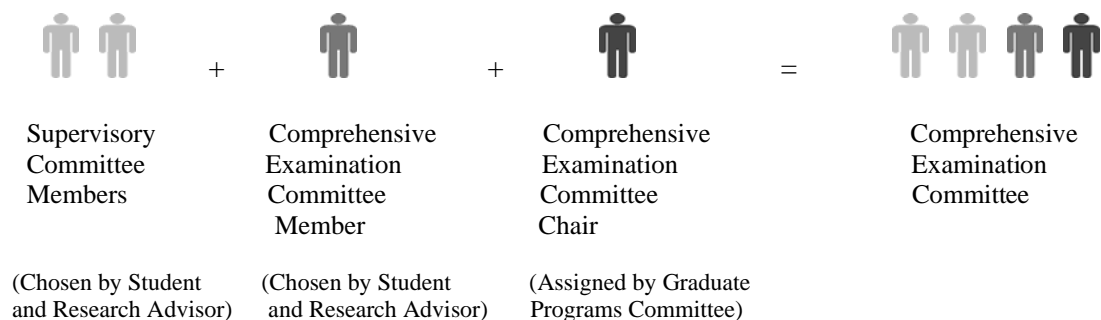
Ph.D. Program

The research advisor is the Chair of the Supervisory Committee. He/she should be a Member of the Chemistry/Biochemistry Graduate Faculty (<http://graduate.asu.edu/gradfaculty>). Note that some members of the graduate faculty who are not members of the Chemistry/Biochemistry Graduate Programs are not endorsed to chair, so students should always check with the Graduate Programs Coordinator.

Members can be Chemistry/Biochemistry Graduate Faculty, Emeritus ASU faculty or a tenured or tenure-track faculty member in a science-related field or engineering with the approval of the Graduate Programs Committee. A non-ASU professor or researcher may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. Students can have more than three Members (including the Chair) but not less than three. **At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the Department of Chemistry and Biochemistry**

Ph. D. Chemistry and Biochemistry Programs

Comprehensive Examination Committee



The Chair of the Comprehensive Examination Committee must be a Chemistry/Biochemistry Graduate Faculty Member and is assigned by the Graduate Programs Committee.

Members include the two Members (not the Chair or Co-Chair) of the Supervisory Committee and a faculty member selected in agreement with his/her advisor to serve on the Comprehensive Examination Committee. This Member can be a Chemistry/Biochemistry Graduate Faculty Member or a tenured or tenure-track faculty member in a science-related or engineering field.

An additional Member can be added, but is not required. This Member can be a Chemistry/Biochemistry Graduate Faculty Member or a tenured or tenure-track faculty in a science-related or engineering field or, with approval from the Graduate Programs Committee, can be a non-tenure-track faculty member, research professional or non ASU professor or researcher

Appendix I



Department of Chemistry and Biochemistry

CHANGE OF ADVISOR

Name of Student: _____
ASU ID: _____

Enrolled in the graduate program since:

Proposed date of change of advisor:

Reason for change of advisor:

Title of present research project:
Summary of present research project:

Title of new research project:
Summary of new research project:

Do you appeal for a delay of the oral exam Yes No
Do you appeal for making further changes to your supervisory committee? Yes No
If yes, please indicate the changes:

To be completed by the New Advisor:

How is the student going to be supported in your group for the next two years? % RA _____ % TA _____
Summer support _____
Comments:

New office room _____ Phone _____

Approvals:

Current Advisor _____
Date: _____
Print Name Signature

New Advisor: _____
Date: _____
Print Name Signature

To be completed by the Graduate Programs Committee:

The oral exam must be taken by _____

Graduate Program Committee: _____
Date: _____

Appendix J

TA Contacts and Coordinators

Dr. Ron Briggs PS H-235 ronbriggs@asu.edu x5-1905
Coordinates all TA assignments and hiring, makes TA assignments for all courses (except for the Organic and Biochemistry courses) and runs the General Chemistry Program

Dr. Chris Pruis PS H-238 Christine.Pruis@asu.edu x5-1989
Coordinates the Organic Chemistry laboratory program and is responsible for TA assignments in the Organic Chemistry courses

Dr. Scott Lefler PS H-236 slefler@asu.edu
x7-8282
Coordinates the Biochemistry laboratory program and is responsible for TA assignments in the Biochemistry courses

Martha McDowell PS D-103 Martha.McDowell@asu.edu x5-4664
Coordinates the department graduate program (including new TA admission and offer letters)

Chad McAllister PS H-137 chad.mcallister@asu.edu x5-4158
Coordinates new TA training/orientation and manages TA office hours in the Learning Resource Center (LRC)