

# Graduate Programs Student Handbook

## Requirements and Procedures

MS Biochemistry  
MS Chemistry  
MS Biochemistry (Medicinal Chemistry)  
PhD Biochemistry  
PhD Chemistry

**2021-2022**

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# Graduate Programs in Chemistry and Biochemistry

## Student Requirements and Procedures Handbook

### 2021-2022

#### **General Information**

##### **Objective**

The objective of this handbook is to outline the requirements set forth by the School of Molecular Sciences (SMS) for graduate students enrolled in programs leading to the MS and PhD degrees in Chemistry and Biochemistry. These requirements are established to enable students to progress through their program in a productive and timely manner. The graduate programs offered by the school 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 School, students must follow those established by the Graduate College, which can be found in the Arizona State University [Graduate Catalog](#).

Previous versions of this Handbook can be obtained by contacting the Graduate Programs Coordinator for the School of Molecular Sciences.

##### **Statement of Inclusivity**

The School of Molecular Sciences:

- Recognizes that informational and social diversity leads to more successful outcomes in science.
- Accepts that we have a moral and ethical duty to create a safe and supportive environment where all community members feel welcome and included.
- Strives to include justice, diversity, equity, and inclusion considerations in all teaching, research and service practices.

Please visit our [Justice, Equity, Diversity, and Inclusion \(JEDI\)](#) webpage for additional information about the initiatives within the School of Molecular Sciences.

##### **Anti-Discrimination Statement**

ASU prohibits all forms of discrimination, harassment and retaliation. To view ASU's policy please see <https://www.asu.edu/aad/manuals/acd/acd401.html>.

Title IX protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. As required by Title IX, ASU does not discriminate on the basis of sex in the education programs or activities that we operate, including in admission and employment. Inquiries concerning the application of Title IX may be referred to the Title IX Coordinator or to the U.S. Department of Education, Assistant Secretary, or both. Contact [titleixcoordinator@asu.edu](mailto:titleixcoordinator@asu.edu) or 480-965-0696 for more information. Office located at 1120 S. Cady Mall, INTDSB 284. For information on making a report please go to [www.asu.edu/reportit/](http://www.asu.edu/reportit/).

## **Land Acknowledgement**

The School of Molecular Sciences acknowledges the twenty-two Native Nations that have inhabited this land for centuries. Arizona State University's four campuses are located in the Salt River Valley on ancestral territories of Indigenous peoples, including the Akimel O'odham (Pima) and Pee Posh (Maricopa) Indian Communities, whose care and keeping of these lands allows us to be here today. The School of Molecular Sciences acknowledges the sovereignty of these nations and seeks to foster an environment of success and possibility for Native American students and increased representation in the molecular sciences.

## **Graduate Programs Committee**

The School of Molecular Sciences Graduate Programs Committee (GPC) is responsible for the development of new programs and serves as the governing board for the school in determining program requirements. The committee is responsible for informing students of these requirements, reviewing petitions when program requirements cannot be met and resolving other matters that may be brought before the committee. The Graduate Programs Committee, under the direction of the Associate Director for Graduate Programs 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 the Associate Director for Graduate Programs, the Graduate Programs Coordinator, and School of Molecular Sciences tenured or tenure-track faculty assigned by the School Director representing the different research areas of study within the school.

Questions regarding these requirements and procedures may be referred to the Graduate Programs Coordinator, via email ([smsgradadvising@asu.edu](mailto:smsgradadvising@asu.edu)), by phone at (480) 965-4664 or in person in PSB 261. Current members of the Graduate Programs Committee can be found in Appendix A.

## **Graduate Programs**

The School of Molecular Sciences offers the following graduate degrees:

Doctor of Philosophy (PhD) in Chemistry  
Doctor of Philosophy (PhD) in Biochemistry

Master of Science (MS) in Chemistry  
Master of Science (MS) in Biochemistry  
Master of Science (MS) in Biochemistry (Medicinal Chemistry) – *Accelerated BS/MS Degree* only

## **Dual Degrees**

The School of Molecular Sciences does not typically allow students to pursue other degrees in conjunction with a graduate degree in the school. Exceptions will be analyzed on a case-by-case basis by petition to the Graduate Programs Committee.

## **Members of the PhD 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 Graduate Faculty for the Chemistry and Biochemistry PhD degrees are listed on the Graduate College's [Graduate Faculty Directory](#). Each member's endorsement is listed indicating the roles he/she can have on a student's committee. All tenured or tenure-track faculty in the School of Molecular Sciences are endorsed to serve as the chair for student committees and are listed in the [faculty directory](#). The distinction between tenured/tenure-track SMS faculty and non-SMS Graduate Faculty 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. Selection of a committee chair from outside of the department can also impact funding status (see Financial Support).

### **Lab Rotations**

All first-year graduate students must be active in a research lab within the first three weeks of their first semester in their program, either through a lab rotation or advisor selection. A lab rotation is a "trial" period for both the student and the prospective advisor. Rotations allow the student get a better understanding of current projects in a particular lab and how he/she might integrate within the group. Rotations also help faculty assess whether the prospective student will be a good fit in their research group. A typical rotation is five weeks. The time can be extended or shortened upon mutual agreement of the research faculty and the student. Students are strongly encouraged to participate in lab rotations to ensure the selected lab provides a good fit for all parties and that potential research topics align with the student's preferences.

It is advised that a new graduate student wait until he/she has heard several faculty talks during the CHM 501 New Student Seminar before submitting a request and should plan to do multiple rotations. Students should contact interested faculty directly to make arrangements to do a rotation. When the new student has determined his/her preference the lab he/she will join and has the agreement of the research faculty member, the agreement is formalized using the PhD Research Advisor Selection Form, found on the Forms page of the [SMS Graduate Advising webpage](#)

### **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 research progress 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.

### **Financial Support**

The department provides financial support to PhD students enrolled in the Chemistry and Biochemistry programs, as indicated in the offer letter, by means of a Graduate Teaching Assistant, Graduate Research Assistantship, Graduate Services Associate position or Fellowship. Specific information regarding the roles, responsibilities and university benefits of the TA/RA position can be found in the [TA/RA Handbook](#) maintained by the Graduate College.

Subject to available funding, students enrolled in the PhD degree programs are offered financial support for five years if they maintain good academic standing in the program and demonstrate

satisfactory performance as a TA. 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, the Graduate Programs Committee, and availability of positions/funding.

Students enrolled in the MS degree in Chemistry, the MS degree in Biochemistry and the Accelerated BS/MS Biochemistry (Medicinal Chemistry) degree are not guaranteed financial support, unless explicitly outlined in the offer letter. Financial support is possible, but is contingent on approval from the student's Research Advisor. Students in MS programs are not eligible for TA positions per guidelines set by The College of Liberal Arts and Sciences. Information regarding tuition costs can be found at <https://students.asu.edu/tuitionandbilling>. Students may also be eligible for [financial aid](#).

**Students funded by the School of Molecular Sciences 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 six credit hours. Students supported by a fellowship must meet the requirements specified by the fellowship.

Students who have been in the Chemistry/Biochemistry PhD Program for more than two years and have dropped to a Chemistry/Biochemistry Master's Program will be given an additional two semesters of financial support to complete their Master's Program. Support is contingent on available funding, satisfactory progress toward the new degree, maintaining good academic standing in the program, and satisfactory performance as a TA. 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, or achieve certification via the speaking section of the TOEFL or IELTS, <https://learnenglish.asu.edu/international-teaching-assistant>. The School of Molecular Sciences requires a score of 50 on the Speak test, or TOEFL/IELTS equivalent. English Certification for TA positions must be obtained by the end of the student's first year in the program. Students are required to demonstrate continued progress in English language skills each semester as determined by one of the following: improved SPEAK Test scores, TA evaluations or Department Instructional Committee.

**PhD Course Enrollment**

Students receiving funding as a Teaching Assistant or Research Assistant should enroll in 18 credit hours per semester for the first four semesters (should have earned 60 credits by end of fourth semester to allow for reduced enrollment in future semesters). Students with other funding (i.e. fellowship, scholarship, Fulbright, etc.) should register for as many hours as allowed by the funding

agency. Summer session enrollment is not required and is contingent on the student's source of financial support. Enrollment information will be sent to students by email at the beginning of summer registration. Registration for 18 credits per semester ensures that students remain on track to achieve the required 84 credit hours in about four (4) years, allowing SMS and the research advisor to explore non-assistantship funding options after the fourth year. Total compensation, including coverage of tuition and health insurance, would remain the same.

Students must complete a total of eight (8) CHM/BCH 501 seminars before graduation (only one 501 seminar is allowed per semester). Students are required to complete a total of six (6) graduate courses, including four (4) prior to the Comprehensive exam, but should not take more than two classes in addition to the 501 seminar in any semester so as to allow enough time for research and TA responsibilities. However, the student should discuss these recommendations with his/her advisor. Students should enroll for at least one (1) credit of CHM/BCH 792 research or CHM/BCH 799 dissertation each semester to ensure insurance coverage for research being conducted in the lab.

Guidance for a proposed plan of study can be found on the [SMS Recommended Plan of Study page](#).

### **MS Course Enrollment**

Students in the MS degree programs are generally not funded by TA or RA and should keep in mind any enrollment requirements associated with previous funding that could require full-time enrollment to maintain deferment status. Enrollment in nine (9) credits is required to maintain full-time student status. Students in the MS degree programs have significant discretion regarding when the courses are completed to provide maximum flexibility for both course selection and financial considerations and should discuss course selection with the research advisor. Students are expected to complete research toward the thesis/applied project every semester as determined in consultation with the research advisor each semester.

Students in the MS degree programs must complete a minimum of 30 credits. Students must complete a total of four (4) CHM/BCH 501 seminars before graduation (only one 501 seminar is allowed per semester and enrollment in CHM 501 New Student Seminar is not allowed). Students are required to complete a total of four (4) graduate courses before graduation. Students should also enroll in at least one (1) credit of CHM/BCH 592 research or CHM/BCH 599 thesis (total of six (6) required-MS Thesis degree) or BCH 593 applied project (BS/MS Med Chem students only – total of two (2) required) each semester to ensure insurance coverage for research being conducted in the lab.

Guidance for a proposed plan of study can be found on the [SMS Recommended Plan of Study page](#)

### ***Late Registration and Add/Drop***

Students who miss the deadline to register for classes or to add/drop a course may incur a late fee. Students should check the university [academic calendar](#) for registration dates. The academic calendar can also be found on MyASU.

A course that is dropped online past the deadline date will result in a grade of “W” (withdrawal) on the student’s transcript. This grade has no impact on the student’s GPA.

Students needing to make a change to their enrollment after the Drop/Add deadline should see the Graduate Programs Coordinator to obtain an Enrollment Change Request form (commonly referred to as the Late Add form).

### **Continuous Enrollment Requirement/Leave of Absence**

Graduate students must be continuously enrolled every Fall and Spring semester from the admit term (semester) through completion. If a student is unable to attend, he or she must apply for a leave of absence. This includes students requesting medical (including the birth of a child if not claiming the [parental leave benefit](#)) or military leave. Students complete the “Continuous Enrollment Doctoral” (for PhD students) or “Continuous Enrollment Masters-Certificate” (for MS students) petition through the interactive Plan of Study (iPOS). The petition will be reviewed by the Graduate Programs Coordinator who will present the request to the Research Advisor and Graduate Programs Committee. Unless extenuating circumstances exist, this petition should be submitted the semester prior to when the student is requesting the leave, but must be submitted before the first day of classes of the semester in which the leave of absence is being requested. 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 by the Research Advisor and Graduate Programs Committee, the Graduate Programs Coordinator will approve and forward the petition to the Graduate College for final consideration.

Student status is discontinued while on a Leave of Absence and students cannot have contact with their research advisor to advance the research or utilize ASU resources (library, fitness center, research labs, etc.). The Graduate Programs Coordinator can provide more information regarding the implications of the Leave of Absence.

### **Medical/Compassionate Withdrawal**

If a situation arises during the middle of the semester that will prevent the completion of coursework, a student may seek a Medical/Compassionate Withdrawal. This process is coordinated through The College of Liberal Arts and Sciences and information about the procedures can be found on their [website](#). It is advised that students discuss the need to pursue this process with the Graduate Programs Coordinator prior to initiating to see if there are alternate options, including discussing possible accommodations with course instructors and/or the research advisor.

### **Session/Program Withdrawal**

Students considering withdrawing from all courses in a semester or from the program completely, should set up an appointment with the Graduate Programs Coordinator to discuss other possible options. Withdrawing from all courses in semester will result in the continuous enrollment requirement not being met and will result in the termination of the graduate program. In the event withdrawal from the entire session or program is the most appropriate course of action, the Graduate Programs Coordinator will help with submitting the necessary forms and assisting with the process of exiting the program.

## **Absence Policy**

Paid vacation is not an employment benefit for Teaching/Research Assistantships. 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 and should consult their TA supervisor to determine the completion date for the TA responsibilities and consult their research advisor to ensure appropriate lab coverage prior to making travel plans. 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 as well as their research advisor and Graduate Programs 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. Additional training may be required for students who will be working in research laboratories that use blood or other potentially infectious materials, lasers, radioactive materials, or especially dangerous chemicals. The research advisor or lab manager will provide information regarding additional required trainings. Safety Training refresher courses are also required to be taken on a yearly basis.

## **Academic Integrity**

Violations to ASU's Academic Integrity Policy 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. The provost maintains a detailed website regarding the [Academic Integrity policy](#). Briefly, violations include, but are not limited to: cheating on exams and assignments, plagiarism, 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. The Graduate College also maintains a [website](#) devoted to preventing academic integrity issues that most often impact graduate students,

Violations of the academic integrity policy that occur within a course will be handled by the course instructor in accordance with the procedures outlined by The College of Liberal Arts and Sciences and Provost. Consequences of violating the academic integrity policy could result in receiving a zero on the specific assignment, a grade of XE for the course, or in some cases dismissal from the graduate program.

Allegations of academic dishonesty that occur outside of a specific course will be reviewed by the Graduate Programs Committee who will decide on the appropriate actions. This may include

reporting the student to The College of Liberal Arts and Sciences and/or the Graduate College with a recommendation for dismissal from the program.

### **Academic Grievance – Grade Appeal**

Students who wish to appeal a course grade, must do so in the semester immediately following the semester for which the grade was received. The [appeal process](#) consists of two stages, an informal process and a formal process. The informal process must be completed first and begins with the conferral with the instructor to provide evidence and reasons for questioning the grade was not received in good faith. The instructor will review the matter, explain the grading procedure, and show how the grade was determined. If the grading dispute is not resolved at this level, the student can appeal to School of Molecular Sciences. The appeal should be directed to the Associate Director for Graduate Programs. If still unresolved, the student can confer with the Dean’s office of The College, [TheCollegeDean@asu.edu](mailto:TheCollegeDean@asu.edu). If still unresolved, the student will initiate the [formal process](#) no later than 10 business days following the meeting with the Dean’s representative.

### **Student Responsibilities and Resources**

As a student at ASU, you are responsible for abiding by all of the policies outlined in the Code of Conduct and are able to take advantage of the many resources that are available to students. The [Dean of Students](#) office is the unit under which most of the resources can be found. You are expected to comport yourself in a professional manner in all interactions at ASU, including the lab, classroom, conferences, or while engaging in any official ASU business. Please also note the ASU Code of Conduct can extend to off-campus, non-student related activities as well.

### ***Code of Conduct***

The Student [Code of Conduct](#) is the list of standards the University has set for all students. The list of prohibited conduct can be found in Section F. The [Student Rights and Responsibilities](#) office is the unit charged with investigating allegations of student misconduct, including but not limited to threatening or disruptive behavior, sexual misconduct and relationship violence, harassment, and weapons. If you observe any Code of Conduct issues you should take the issue to your supervisor, Instructor of record for TA related issues, or your Research Supervisor if observed in the lab. If you are not comfortable taking this to your supervisor, you can speak with the Graduate Programs Coordinator or the Associate Director for Graduate Programs.

### ***Student Support/Resources***

There are many resources and offices available to assist you during your time as a student. Many of the resources can be accessed through your [MyASU](#) and at the Dean of Students [Resources page](#). Some of the most commonly accessed services/resources are listed below.

- [Career Services](#)
- [Counseling Services](#)
- [Student Accessibility and Inclusive Learning Services](#)
- [Health Services](#)
- [International Student Engagement](#)
- [International Students and Scholars Center \(ISSC\)](#)
- [Off-Campus Housing](#)

- [OUT@ASU](#)
- [Parent and Family Resources](#)
- [Parking and Transit](#)
- [Pat Tillman Veterans Center](#)
- [Student Advocacy and Assistance](#)
- [Student and Cultural Engagement](#)
- [Sun Devil Fitness Center](#)
- [University Technology Office](#)
- [Wellness](#)
  - [Graduate Wellness Resources](#)
  - [10 Best Practices](#)

## **Master of Science in Biochemistry/Chemistry**

### **Admissions**

A limited number of students will be admitted to the MS degree programs. Interested students should identify a research advisor ([tenure/tenure-track faculty member from SMS](#)) with whom they are interested in working and receive their explicit approval prior to applying. The [MS application](#) is a two-part application, a general application through ASU Admission Services and a supplemental application to the School of Molecular Sciences.

### ***Minimum Admission Requirements***

- Bachelor of Science degree in chemistry, biochemistry, or closely related discipline with appropriate coursework
  - Applicants from 3-year Indian institutions must have completed a Master's degree.
- GPA of at least 3.0
- International Applicants must have a TOEFL/IELTS score less than 2 years old (minimum score 80 (TOEFL) or 6.5 (IELTS))
  - Please consult the [English Proficiency page](#) provided by ASU Admission Services for more information about the minimum requirements and potential exemptions.

### ***Application***

The School of Molecular Sciences utilizes a two-part application, a general application to Graduate Admission Services, and a supplemental application to the School of Molecular Sciences. Students first submit the general application and 24-48 hours after can access and submit the supplemental application. Students will receive an email when the [supplemental application](#) is available.

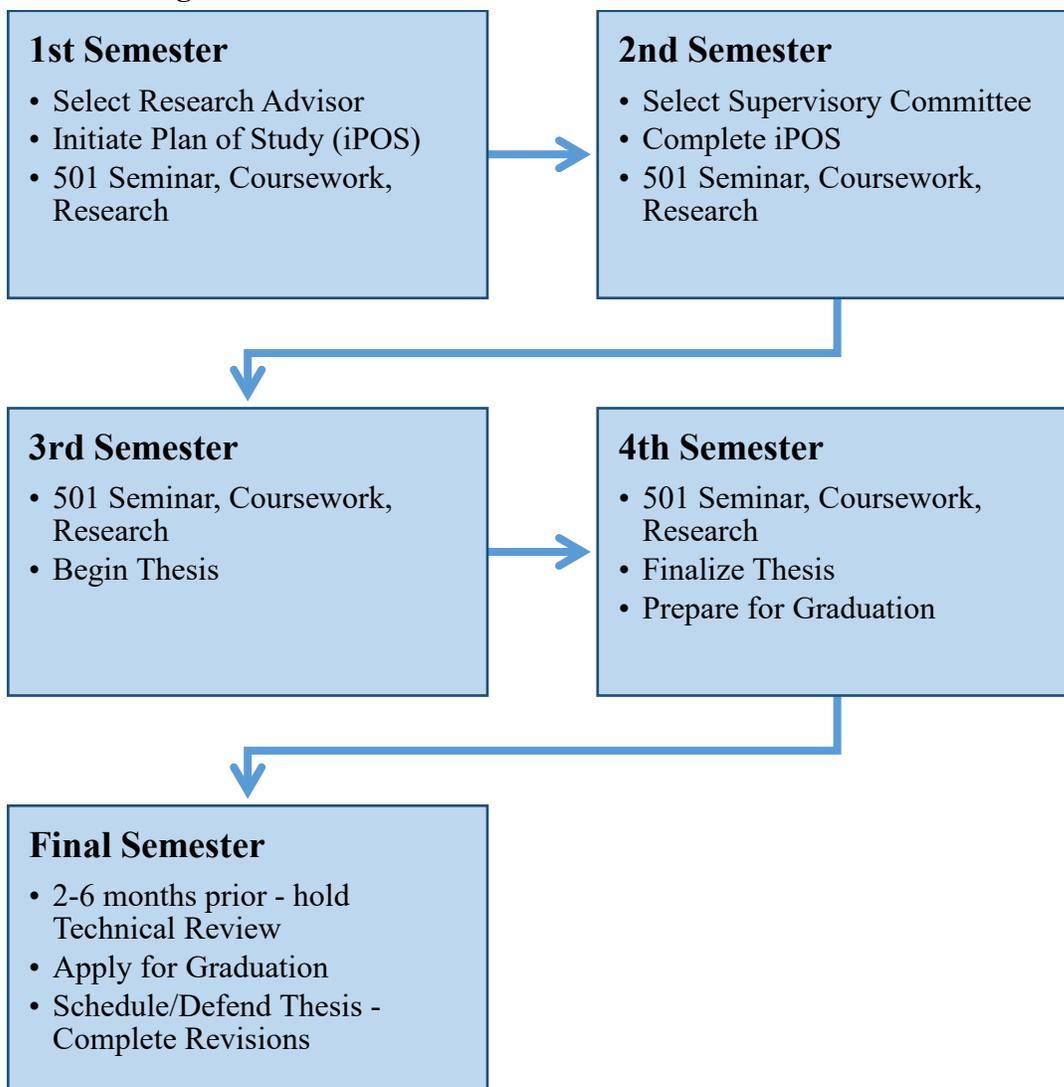
### ***General Application Materials***

- Beginning/ending dates and location(s) of your academic degree(s)
- Grade point average (GPA)
- TOEFL scores (unofficial scores can be used in your initial application)
- Unofficial transcripts saved in a single file (electronic)

### ***Supplemental Application Materials***

- Areas of research and identified research supervisor
- A brief Personal Statement that includes a narrative concerning your motivations for graduate study in chemistry or biochemistry, career goals, further information on research experience, potential ASU faculty interests and a list of all honors, awards and scholarships.
- Contact information (email address) for three (3) faculty members who will write letters of recommendation for you and can comment on your suitability for advanced scholarly work. One of these must be your current research supervisor.
- GPA, TOEFL/IELTS scores, unofficial transcripts (electronic)
- Additional letter of recommendation from the selected research advisor (if not included as one of the three required), submitted as an additional reference, is encouraged, but not required.

## Outline of MS Program



### Program Fees

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

### Duration of Program

The Master's Degree is typically completed in two years; however, more time may be needed depending on the research project. According to 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 who have been in a Chemistry/Biochemistry PhD Program for more than two years and have dropped to a Chemistry/Biochemistry Master's Program will be given an additional two

semesters of financial support to complete their Master's Program, contingent on available funding, satisfactory progress toward the degree, good academic standing in the program, and satisfactory teaching evaluations. 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.

### **Supervisory Committee**

The Supervisory Committee consists of the student's Research Advisor, who is the student's main mentor and Chair of the Supervisory Committee, and two additional tenured or tenure track faculty members. The student has the option of having two Research Advisors who serve as Co-Advisors (Co-Chairs) and may have more than the two required members.

#### ***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 PhD Graduate Faculty. A complete listing of the faculty members can be found on the Graduate College [Graduate Faculty website](#).

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

- Members of the Chemistry and Biochemistry PhD Graduate Faculty
- 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. The member must be actively engaged in research associated with the student's research (Students should see the Graduate Programs Coordinator)

#### ***Who can serve as a Supervisory Committee Member?***

Members of the Chemistry and Biochemistry PhD Graduate Faculty

- 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. The member must be actively engaged in research associated with the student's research (Student should see the Graduate Programs Coordinator)
- **Members cannot be directly involved in the student's research.**

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

#### ***Supervisory Committee Member Summary: (See Appendix C)***

The Chair of the Supervisory Committee must be selected from faculty members from the Chemistry or Biochemistry PhD Graduate Faculty. Members can be Chemistry/Biochemistry PhD

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 who is actively engaged in research associated with the student's research may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. The Supervisory Committee is composed of a Research Advisor (and Co-Advisor if appropriate) and two additional members (can have more than two). **At least two Members of the Supervisory Committee (including the chair) must be tenured or tenure-track Faculty in the School of Molecular Sciences.** Members cannot be directly involved in the student's research. An eligible faculty member who is actively involved in the student's research may, with the approval of the advisor, act as a co-advisor.

### 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 School of Molecular Sciences, but must be related to the student's research and approved by the research advisor. (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/BCH 501 (1 credit each, 4 required)
- Research (CHM/BCH 592) is required for every semester the student is involved in research (total of 6 credits minimum)
  - Students in Biochemistry MS should enroll for BCH 92 Research
  - Students in Chemistry MS should enroll for CHM 592 Research
- Six hours of Thesis (CHM/BCH 599) must be taken and included on the student's Plan of Study (iPOS).
  - Students in Biochemistry MS should enroll for BCH 592 Research
  - Students in Chemistry MS should enroll for CHM 592 Research
- 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 additional research credit hours. Only one 400-level course can be counted on the iPOS.

*Note on Courses:* Students cannot take more than one 501 seminar per semester.

**The Graduate Programs 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.**

### *Interactive Plan of Study*

The Interactive Plan of Study (iPOS) is an agreement between the student, SMS, and ASU indicating the courses the student will take to complete the degree 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 needs to be completed by the end of the student's first semester in residency.

The process of completing and submitting the iPOS is done through the student's MyASU. Instructions for completing the iPOS can be found on the Graduate College's [Plan of Study page](#).

See Appendix B for an additional reference on completing the iPOS. The Graduate Programs Coordinator can assist students with the completion of the iPOS. Revisions to the Plan of Study are easily made online and should be made on a yearly basis if needed. The Graduate Programs Coordinator can assist you with this. All courses included on the iPOS, including research and thesis credits must be completed and show a grade before the MS Degree can be verified and posted by the Graduation Office.

### **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. The Graduate College allows for up to 12 credits to be counted as Pre-Admission Requirements. The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript (original transcript must be on file with 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 advisor 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.

### **Internships**

Participation in an internship opportunity is not required, but is an option for students seeking to enhance their preparation beyond their dissertation research and teaching responsibilities. Students are responsible for finding their own internship experience. For students seeking credit (CHM/BCH 584), the internship experience must satisfy the following criteria:

- The internship opportunity must be directly related to the student's field of study
- The internship opportunity must be academically useful
  - For International students, the internship must have direct impact on the completion of the dissertation in order to meet CPT criteria
- The internship responsibilities must be action-based, as job shadowing will not be approved
- The internship opportunity should provide for the integration of academic learning and on-the-job training
- The type of work should challenge the student's initiative and creativity

- The internship opportunity must be supervised by the employer or designated staff member

Students are responsible for finding and securing placement. The following documents and forms must be completed, signed and then submitted to the Graduate Coordinator/Internship Coordinator.

- Internship offer letter on organization letterhead
- Internship Position Description (generated by employer, can be attached to offer letter)
- SMS Internship Educational Agreement (can be obtained from SMS Advising Office)
- Student Placement Agreement (can be obtained from SMS Advising Office)

Participation in an internship opportunity could impact funding eligibility. Students should discuss participation with both the research supervisor and Graduate Programs Coordinator to clarify funding and program status/implications and receive approval. International students will also need to seek guidance from ISSC to ensure eligibility and ensure they remain in good standing regarding their immigration status.

### **Maintaining Satisfactory Academic Progress**

Students must maintain a GPA of 3.0 on the iPOS courses, graduate coursework (500-level and above) and the cumulative GPA (all ASU coursework). The GPA is checked at the end of each semester. A student whose GPA drops below 3.0 on any of the above GPAs is not considered to be progressing in the program satisfactorily and will be placed on academic probation and afforded one semester to bring the impacted GPA to 3.0 or better.

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 [Satisfactory Academic Progress Policy](#) section of this manual and may include the following recommendations:

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

If a student's GPA falls below 2.0 at any time, the Graduate Programs Committee may ask the School Director to write a letter to The College of Liberal Arts and Sciences and the Graduate College recommending immediate dismissal from the 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.) Early completion of both of

these tasks is strongly encouraged. Students who are unable to meet these deadlines 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 outlined in the [Satisfactory Academic Progress Policy](#) section of this manual.

### ***Technical Review***

Two 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 suggestions for improving any areas of weakness. This review commonly consists of a 30-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. At the conclusion of the Technical Review, committee members should sign the Technical Review for Final Master's Defense form. The form can be obtained from the Forms section of the [SMS Graduate Advising webpage](#). A final defense will not be approved for scheduling unless the signed form is on file with the Graduate Programs Coordinator.

### ***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. Each student is required to present the results of his/her thesis during a final oral defense.

## **Steps Toward Graduation and Graduation Requirements**

### ***Apply for Graduation***

The Graduate College has firm deadlines for graduation all students must follow. Information on how to apply and follow the status of your application can be found on the Graduate College [Completing your Degree](#) webpage. It is important to click on the link found on this website titled "Graduation Deadlines" for information on how and when to meet each deadline date.

There is a checklist on each student's MyASU page in the My Programs section that lists the items to be completed for graduation. It also shows the status of the student's graduation application. All documents, with the exception of the final submission to ProQuest, will be submitted within the iPOS.

### ***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. The date must meet deadlines set by the Graduate College. When the date and time have

been established, the student should reserve a conference room for the defense. Conference rooms in the Physical Sciences buildings (C, D, E, H) are reserved in the main School of Molecular Sciences office – PSD 104. (Renovations to the Physical Sciences building’s D and E wings will impact the availability of conference rooms.)

A copy of the thesis must be submitted to each member of the Supervisory Committee **at least two weeks** prior to the final MS thesis defense. The document submitted should be a draft that has been reviewed by the advisor and is ready to defend. **Minor** revisions may be needed following the exam.

### ***Schedule of Defense Form and Format Review – 10 Day Rule***

Students must meet the Graduate College requirement of submitting a request to hold a final defense at least 10 working days before the planned defense. The Graduate College 10 Working Day Calendar must be used to determine the 10 days.

The student selects the “Defense” tab in his/her iPOS and selects the option to schedule the defense.

The student must also submit the thesis document for format review to the Graduate College at least 10 calendar days prior to the scheduled defense date. The Graduate College [Format Manual](#) guidelines must be followed. The Graduate College has designed a formatting tool, called the “Format Wizard” to assist students with formatting the title page, table of contents, list of illustrations, acknowledgements, etc. The format tool and instructions for using it can be found on the Graduate College [Completing Your Degree](#) page under the “Formatting Your Thesis or Dissertation” link in the menu on the left side of the page. It is suggested that the document is first completed and then cut and pasted into the formatting tool. If format revisions are required, students should make the necessary revisions and resubmit to the format tab in the iPOS until format approval is received. Students should simultaneously complete format revisions and any revisions requested by the committee.

### ***Request to Delay Thesis Publication***

The student can request that the thesis document is not made public for a certain period of time in cases involving work of a sensitive nature. This decision should be made after consulting with the advisor or co-advisors. The request for a delay is referred to as an “embargo” and must be requested using the “Delaying Publication of Thesis/Dissertation (Embargo Status) form found at <https://graduate.asu.edu/student-forms>. The student also indicates the need for an embargo when the final document is submitted to ProQuest.

### ***Announcement of the Master’s Final Defense***

An email announcement of the final defense is sent to all students, faculty and staff in the School of Molecular Sciences. Two weeks prior to the defense, the student must email the following information to the Graduate Programs Coordinator:

- Thesis title
- Abstract
- List of publications

- Name as it should appear
- Committee member names as they should appear
- Date, time, and location of defense.

The student may also request that the announcement be sent to other departments with related research interests.

### ***Master's Final Defense***

The final defense of the thesis must take place by the deadline date specified by the Graduate College. 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 the Supervisory Committee must sign the "Report for Master's Thesis/Practicum Defense" form provided by the Graduate College via DocuSign. Immediately following the defense, the committee signs to note the outcome and provide an account of any required revisions. Once the required revisions have been completed, the Chair/Co-Chairs sign the form again. If no revisions are required, the Chair/Co-Chairs sign the form again. There are no paper forms to submit, everything is done through DocuSign.

The student will receive a copy of the form following the completion of the first round of signatures and once the form is signed by the Chair/Co-Chairs for the final time.

The Graduate Programs Coordinator receives a copy of the forms and is available as a resource should the student have questions about the status of signatures.

### ***Thesis Submission***

When the student has successfully completed the final defense, the final revisions of the thesis document have been approved by the Supervisory Committee Chair and the document has format approval, the student submits the thesis to UMI/ProQuest for publication. (Description and procedure for this process can be found through the link on the student's MyASU Defense tab.) The Graduate College format office reviews the final submission and, if there are no additional corrections, they will notify ProQuest the document has received final approval.

The thesis is uploaded to the digital repository of the library. Bound copies are no longer provided to the library. Students are not obligated to do so, but may purchase bound copies according to his/her needs – a copy for the research advisor, family members and/or a copy for the student's own reference or library.

Students should be aware that ProQuest can sell the thesis document through a third party (like Amazon.com) and the student receives no compensation. There is a drop-down menu on the ProQuest form that can be selected to indicate the student's request that the document not be sold through a third party. It will not default to this – the student must select it.

### *Awarding of the Degree*

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

- Satisfactorily completed required coursework with a cumulative GPA, Graduate GPA and iPOS GPA of 3.0 or better
- Conducted research at ASU under the direction of a tenured/tenure track faculty member in the School of Molecular Sciences
- Written MS 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 and University Registrar’s Graduation Office.

## **Master of Science in Biochemistry (Concentration in Medicinal Chemistry) – Accelerated BS/MS Degree**

### **Admissions**

This degree is only being offered as an [Accelerated 4+1 BS/MS](#) degree for students enrolled in an approved BS degree at ASU. Applications for study outside this framework are not being accepted. Potential students must submit a [Pre-Application](#) in order to be considered for this program.

### ***Minimum Admission Requirements***

- Enrollment in one of the following BS degree programs: chemistry, biochemistry, biochemistry (medicinal chemistry), or molecular biosciences and biotechnology with no more than two semesters (fall/spring) remaining.
- Completion of 85 semester hours with a cumulative undergraduate GPA of 3.4 or better on a 4.0 grading scale
- Completion of BCH 461 and completion of or enrollment in BCH 462 the semester the program is initiated. (Recommended)
- Identification of a Research Advisor and establishment of a research project that has been approved by the research advisor along with a plan for initiating the research.

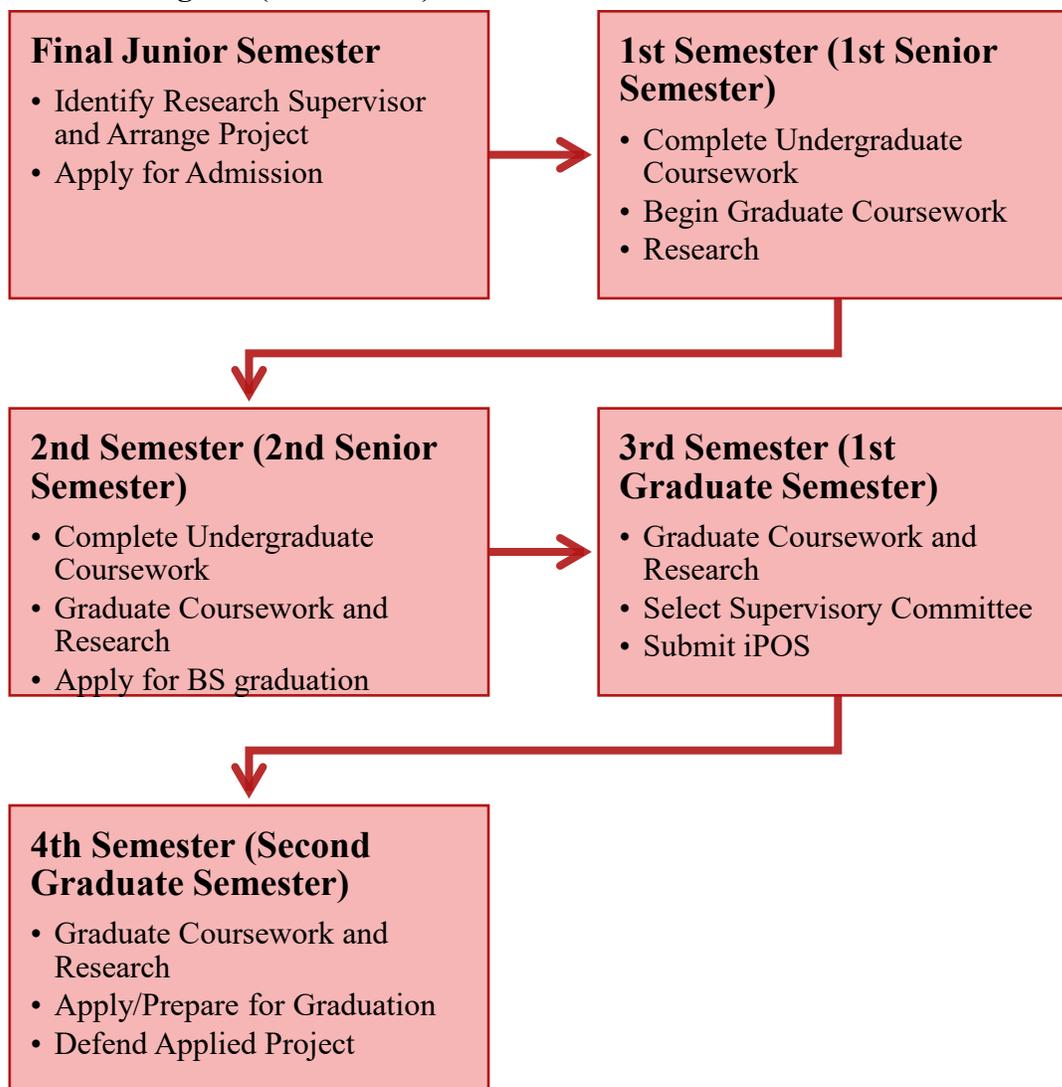
### ***Application***

Interested students should complete and submit an online [Pre-Application](#) to the School of Molecular Sciences. If accepted, students will be notified of the next step, which include submitting an official application through Graduate Admissions Services.

### ***Required Application Materials***

- Personal statement that includes your professional goals and how they relate to the medicinal chemistry program
- Two letters of recommendation. One letter from your current research advisor and one from the selected MS research advisor. In cases where the current and future advisor are the same, or in the absence of a current research advisor, a letter from a course or laboratory faculty instructor can be substituted. Letters must be submitted electronically. Email addresses are used to track the letters, so applicants must be sure to enter the correct email address for each person listed. These email addresses will be entered within the online Pre-Application (see below).
- A personal interview with the Admissions Committee or a member of the Admissions Committee may be required if additional information is needed to determine eligibility for admission to the program

## Outline of MS Program (4+1 BS/MS)



This Master's program is designed for students who are currently pursuing a Bachelor of Science degree in Biochemistry, Biochemistry (Medicinal Chemistry), Chemistry, or Molecular Biosciences and Biotechnology at ASU and want to improve their background in chemistry and biochemistry before entering professional 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.

### ***Program Fees***

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

### ***Duration of Program***

The medicinal chemistry program is designed as an accelerated program for students continuing their education in a professional program; therefore, students are expected to complete requirements within four semesters. Students who do not complete the program by the end of their fourth semester must petition the Graduate Programs Committee for an extension to complete the degree. The count begins from the first semester of admission to the program.

### **Supervisory Committee**

The Supervisory Committee consists of the student's Research Advisor, who is the student's main mentor and Chair of the Supervisory Committee, and two additional members. The student has the option of having two Research Advisors who serve as Co-Advisors (Co-Chairs) and may have more than the two required members.

#### ***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 PhD Graduate Faculty. A complete listing of the faculty members can be found on the Department website at: <https://graduate.asu.edu/graduate-faculty>. The research advisor should be conducting research that is medicinal in nature.

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

- Members of the Chemistry and Biochemistry PhD Graduate Faculty.
- 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. The member must be actively engaged in research associated with the student's research. (Students should see the Graduate Programs Coordinator.)

#### ***Who can serve as a Supervisory Committee Member?***

- Members of the Chemistry and Biochemistry PhD Graduate Faculty.
- 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. The member must be actively engaged in research associated with the student's research. (Student should see the Graduate Programs Coordinator)
- **Members cannot be directly involved in the student's research.**

The Supervisory Committee serves as the Applied Project Committee for MS students. Additional faculty or researchers can be added to the committee after the Plan of Study has been completed. Students who want to add an additional Member should see the Graduate Programs Coordinator.

### ***Supervisory Committee Member Summary: (See Appendix C)***

The Chair of the Supervisory Committee must be selected from faculty members from the Chemistry or Biochemistry PhD Graduate Faculty. Members can be Chemistry/Biochemistry PhD 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 who is actively engaged in research associated with the student's research may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. The Supervisory Committee is composed of a Research Advisor (and Co-Advisor if appropriate) and two additional members (can have more than two). Members cannot be directly involved in the student's research. An eligible faculty member who is actively involved in the student's research may, with the approval of the advisor, act as a co-advisor.

### ***Course Requirements***

A minimum of 30 credit hours are required, including coursework, seminars, research and an applied project consisting of a written research paper and informal defense. Courses are selected by students in consultation with their supervisory committee based on the research area.

The Master of Science in biochemistry is awarded when the student has obtained a minimum cumulative GPA of 3.00 (scale is 4.00 = "A") in coursework, demonstrated quality performance in the laboratory and completion of the research project, completed and presented an approved research paper at an oral defense to the student's supervisory committee, and met all deadline dates and requirements set by the Graduate College.

### ***Recommended Program of Study***

- 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 research 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 BCH 593 – Applied Project – To be taken as a capstone course
- Six credit hours of electives – can be additional research credits or 500-level courses (only one 400-level course can be counted on the iPOS)

*Note on Courses:* Students cannot take more than one 501 seminar per semester.

### ***Scholastic Requirements***

Students must maintain a GPA of 3.0 on the iPOS courses, graduate coursework (500-level and above) and the cumulative GPA (all ASU coursework). The GPA is checked at the end of each semester. A student whose GPA drops below 3.0 on any of the above GPAs is not considered to be progressing in the program satisfactorily and will be placed on academic probation and afforded one semester to bring the impacted GPA to 3.0 or better.

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 [Satisfactory Academic Progress Policy](#) sections of this manual and may include the following recommendations:

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

If a student's GPA falls below 2.0 at any time, the Graduate Programs Committee may ask the School Director to write a letter to The College of Liberal Arts and Sciences and the Graduate College recommending immediate dismissal from the current graduate program.

### ***Extracurricular Courses***

Students interested in taking courses in addition to those included in their plan of study should obtain authorization from their research advisor 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 and/or removal from the program.

### ***Shared Courses***

Courses taken in the final two semesters of the undergraduate degree while admitted to the Accelerated BS/MS may be used toward the required number of courses and total semester hours needed for the MS degree with the approval of the Graduate Programs Committee. A total of 12 credit hours can be counted toward the MS degree as Pre-Admission credit, with up to 9 credit hours shared between the BS and MS degrees. Shared courses must meet the degree requirements for the MS degree.

## **Program Progression**

### ***Selecting a Research Advisor and Supervisory Committee***

Research Advisors must be selected at the time of application. The additional committee members should be selected during the first graduate semester. Only the Research Advisor or Co-Advisor needs to be a tenured or tenure-track faculty member from the School of Molecular Sciences.

### ***Interactive Plan of Study***

The Interactive Plan of Study (iPOS) is an agreement between the student, SMS and ASU indicating the courses the student will take to complete the degree 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 needs to be completed by the end of the student's first semester in residency. The process of completing and submitting the iPOS is done through the student's MyASU. Instructions for completing the iPOS can be found on the Graduate College's [Plan of Study page](#). See Appendices B and C for an additional reference on completing the iPOS. The Graduate Programs Coordinator can assist students with the completion of the iPOS. Revisions to the Plan of Study are easily made online and should be made on a yearly basis if needed. The Graduate Programs Coordinator can assist you with this. All courses included on the iPOS, including research and thesis credits, must be completed and show a grade before the MS Degree can be verified and posted by the Graduation Office.

### ***Applied Project***

The culminating experience is an applied project in the area of medicinal 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.

- 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.
- 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 for graduation, which all students must follow. Information on how to apply and follow the status of your application can be found on the Graduate College website: <https://graduate.asu.edu/completing-your-degree>.

### ***Schedule Defense of the Research Portfolio/Applied Project***

Students should contact the members of their Supervisory committee to determine the best date for defending the Research Portfolio/Applied Project. The defense should be held no later than the last day of classes. Once the date and time are established, a conference room should be reserved. Conference rooms in the Physical Sciences buildings (C, D, E, H) are reserved in the main School of Molecular Sciences office – PSD 104. (Renovations to the Physical Sciences building's D and E wings will impact the availability of conference rooms.) 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.

A copy of the written document must be submitted to each member of the Supervisory Committee **at least two weeks** prior to the final defense. The document submitted should be a draft that that

was reviewed with the student and his/her advisor and ready to defend. **Minor** revisions may be needed following the exam.

### ***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 Head of the Academic Unit and reports the completion of the requirement to the Graduate College.

A final copy of the written document must be submitted to the Graduate Programs Coordinator and filed as part of the student’s academic record.

### ***The Awarding of the Degree***

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

- Satisfactorily completed required coursework with a cumulative GPA, Graduate GPA and iPOS GPA of 3.0 or better
- Conducted research at ASU under the direction of an approved tenured or tenure-track faculty member in the School of Molecular Sciences
- 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 Biochemistry/Chemistry**

### **Admissions**

Applications are accepted for fall semesters only. Applications are due by January 1 of each year for the following fall semester, i.e. Applications due Jan. 1, 2022 for fall 2022 semester. The PhD application is a [two-part application](#), a general application through ASU Admission Services and a supplemental application to the School of Molecular Sciences.

### ***Minimum Admission Requirements***

(set by the Graduate College)

- Bachelor of Science degree in chemistry, biochemistry, or closely related discipline with appropriate coursework
  - Applicants from 3-year Indian institutions must have completed a Master's degree.
- GPA of at least 3.0
- International Applicants must have a TOEFL/IELTS score less than 2 years old (minimum score 80 (TOEFL) or 6.5 (IELTS))
  - Please consult the [English Proficiency page](#) provided by ASU Admission Services for more information about the minimum requirements and potential exemptions. Exemption from the English Proficiency requirement applies only the admission process and does not apply to the spoken English requirement for the Teaching Assistant position.

GRE is not required

### ***Desired Admission Requirements***

(to be considered competitive by SMS)

- GPA of at least 3.4
- Research experience and a letter of recommendation from a faculty research supervisor
- A TOEFL score of 100 with a speaking section score of 23 or better or IELTS overall band score of 7 with a speaking band score of 7 (additional English requirements are required by ASU for employment as a TA for speaking scores section scores less than 24 (TOEFL) or 7.5 (IELTS)) (For international applicants)

### ***Application***

The School of Molecular Sciences utilizes a two-part application, a general application to Graduate Admission Services, and a supplemental application to the School of Molecular Sciences. Students first submit the general application and 24-48 hours after can access and submit the supplemental application. Students will receive an email when the [supplemental application](#) is available.

### ***General Application Materials***

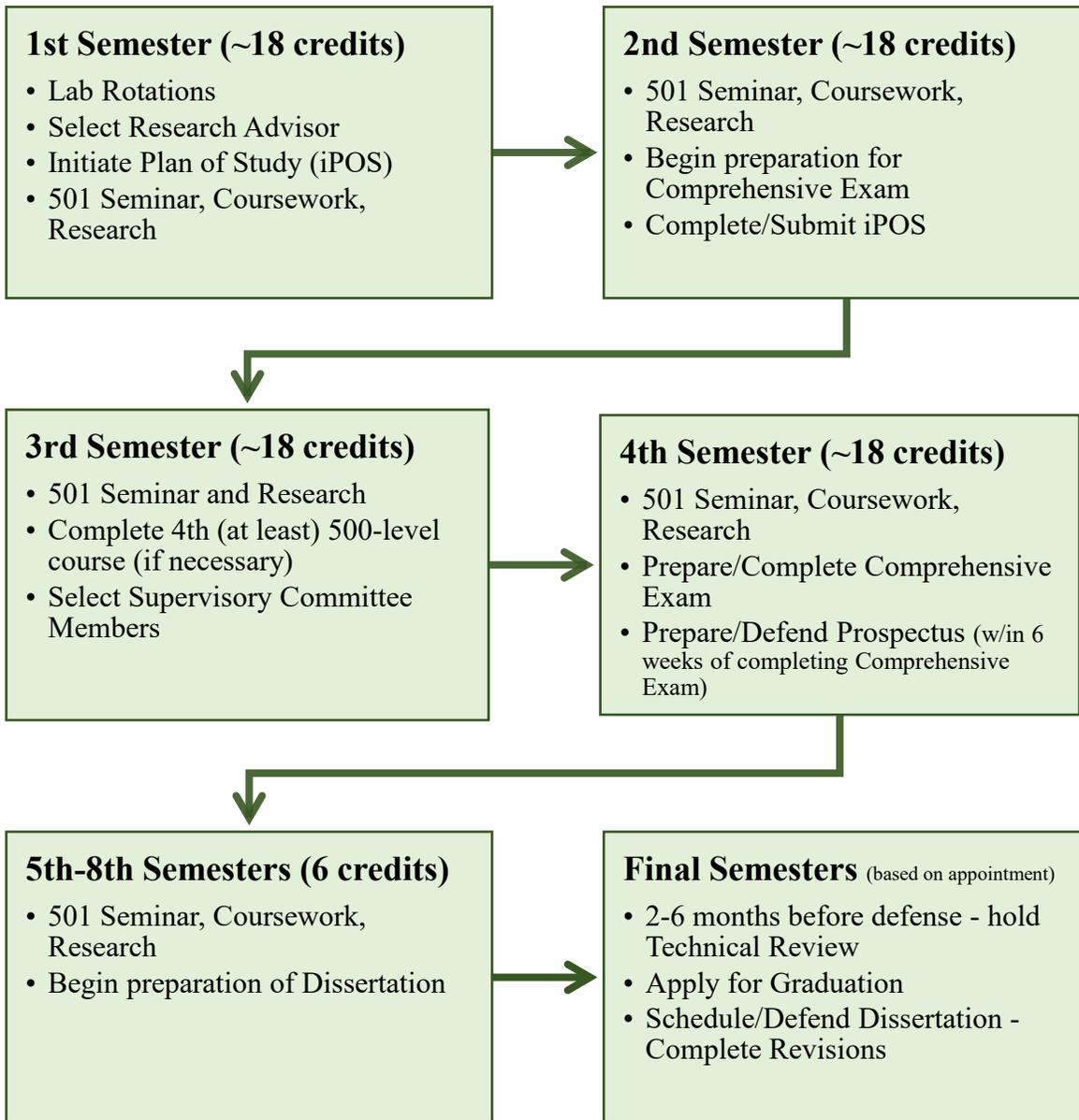
- Beginning/ending dates and location(s) of your academic degree(s)
- Grade point average (GPA)
- TOEFL scores (unofficial scores can be used in your initial application)
- Unofficial transcripts saved in a single PDF (electronic)

- Unofficial transcripts submitted during the general application will allow for expedited admission if accepted as they can be used in place of official documents for the purpose of admission.

*Supplemental Application Materials*

- Areas of research and faculty member interest
- A brief Personal Statement that includes a narrative concerning your motivations for graduate study in chemistry or biochemistry, career goals, further information on research experience, potential ASU faculty interests and a list of all honors, awards and scholarships.
- Contact information (email address) for three (3) faculty members who will write letters of recommendation for you, and can comment on your suitability for advanced scholarly work. One of these must be your current research supervisor.
- GPA, TOEFL/IELTS scores, unofficial transcripts (individual files) (electronic)

## Outline of PhD Program



### Duration of Program

Students in the PhD degree programs typically take four to six years to complete the program. The MS degree is not a prerequisite for the PhD program. The PhD degree must be completed within ten years from the time of initial enrollment. The graduation deadline can be found in the iPOS and in MyASU under the My Programs section.

### Supervisory Committee

The Supervisory Committee consists of the student's Research Advisor, who is the student's main mentor and Chair of the Supervisory Committee, and two additional tenured or tenure track faculty

members. The student has the option of having two Research Advisors who serve as Co-Advisors (Co-Chairs) and may have more than the two required members.

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/Biochemistry PhD Graduate Faculty are listed on the Graduate College's [Graduate Faculty website](#). This list includes all members of the School of Molecular Sciences 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. Graduate Faculty membership is by degree, and the approved Graduate Faculty are not the same for the Chemistry and Biochemistry PhD degrees as some faculty from outside the School may not be approved for both degrees. Contact the Graduate Programs Coordinator if you have questions.

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

- The Research Advisor must be selected from the Chemistry/Biochemistry PhD [Graduate Faculty](#).
  - All tenured or tenure-track faculty of the School of Molecular Sciences are endorsed to chair for both Chemistry and Biochemistry PhD Degrees. (A complete listing of the faculty members can be found on the School website at: <http://chemistry.asu.edu/graduate/facultyResearch.asp>)
  - Most, but not all members of the Chemistry/Biochemistry PhD Graduate Faculty are endorsed to chair. Students should always check with the Graduate Programs Coordinator. If the selected Research Advisor does not have a tenure-home in the School of Molecular Sciences, additional paperwork will be required to verify the continuation funding. The funding guarantee outlined in the admission offer letter only applies if an advisor within the School of Molecular Sciences is selected.

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

- Members of the Chemistry/Biochemistry PhD 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 Co-Advisor with approval from the Graduate Programs Committee and the Graduate College. (Student should check with the Graduate Programs Coordinator)

***Who can serve as a Supervisory Committee Member?***

- Members of the Chemistry/Biochemistry PhD 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. The member must not be actively engaged in research associated with the student's research. (Student should see the Graduate Programs Coordinator)

- Members of the committee (outside of Advisor/Co-Advisor) cannot be directly involved in the student's research.

The Supervisory Committee serves as the Dissertation Committee for PhD students and will be responsible for approving both the Dissertation Prospectus and final Dissertation. 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 the Chemistry/Biochemistry PhD Graduate Faculty. Members can be Chemistry/Biochemistry PhD 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 and the Graduate College. A non-ASU professor or researcher who is actively engaged in research associated with the student's research may serve as a Co-Advisor with approval from the Graduate Programs Committee and the Graduate College. The Supervisory Committee is composed of a Research Advisor (and Co-Advisor if appropriate) and two additional members (can have more than two). **At least two Members of the Supervisory Committee (inclusive of Advisor/Co-Advisors) must be tenured or tenure-track faculty in the School of Molecular Sciences.** Members cannot be directly involved in the student's research. An eligible faculty member who is actively involved in the student's research may, with the approval of the advisor, act as a co-advisor.

**Comprehensive Examination Committee**

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-Chairs of the Supervisory Committee)
- A third faculty member selected by the student in agreement with the advisor
  - Chemistry/Biochemistry PhD 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 PhD 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 who is actively engaged in research with approval of the Graduate Programs Committee.

### ***Comprehensive Examination Committee Member Summary: (See Appendix E)***

The Chair of the Comprehensive Examination Committee must be a Chemistry/Biochemistry PhD 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 PhD 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 PhD 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 with the approval of the Graduate Programs Committee.

### **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 School of Molecular Sciences, but must be related to the student's research and approved by the research advisor. (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)
  - Four 500-level courses, or three 500-level with a fourth in progress, must be completed before taking the comprehensive exam
- Eight CHM/BCH 501 seminars
  - CHM 501 New Student Seminar for students entering in the Fall Semester (counts as one of the eight required)
- Research (CHM/BCH 792) is required for every semester the student is involved in research
  - Students in Biochemistry PhD should enroll for BCH 792 Research
  - Students in Chemistry PhD should enroll for CHM 792 Research
- 12 semester credit hours of Dissertation (CHM/BCH 799)
  - Students in Biochemistry PhD should enroll for BCH 799 Dissertation
  - Students in Chemistry PhD should enroll for CHM 799 Dissertation

#### *Note on Courses:*

Students cannot take more than one 501 seminar in any semester

Students should enroll for a total of 18 credits each semester until the required 84 credits (including dissertation) have been completed.

**The Graduate Programs 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.**

### **Transfer Courses**

Students enrolled in a PhD 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 apply 30 credit hours toward the PhD degree. Transfer credits will count toward the 84 total credit hours required **but not** toward the six required courses. Students with an MS 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 three. The request is made by submitting a copy of the course(s) syllabus, a copy of the transcript (original transcript must be on file with 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 student's current PhD 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.

All transfer courses must be directly related to the PhD degree program.

### **Extracurricular Courses**

Students interested in taking courses in addition to those included in their plan of studies should obtain authorization from their research advisor 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.

### **Internships**

Participation in an internship opportunity is not required, but is an option for students seeking to enhance their preparation beyond their dissertation research and teaching responsibilities. Students are responsible for finding their own internship experience. For students seeking credit (CHM/BCH 784), the internship experience must satisfy the following criteria:

- The internship opportunity must be directly related to the student's field of study
- The internship opportunity must be academically useful
  - For International students, the internship must have direct impact on the completion of the dissertation in order to meet CPT criteria
- The internship responsibilities must be action-based, as job shadowing will not be approved
- The internship opportunity should provide for the integration of academic learning and on-the-job training
- The type of work should challenge the student's initiative and creativity
- The internship opportunity must be supervised by the employer or designated staff member

Students are responsible for finding and securing placement. The following documents and forms must be completed, signed and then submitted to the Graduate Coordinator/Internship Coordinator.

- Internship offer letter on organization letterhead
- Internship Position Description (generated by employer, can be attached to offer letter)
- SMS Internship Educational Agreement (can be obtained from SMS Advising Office)
- Student Placement Agreement (can be obtained from SMS Advising Office)

Participation in an internship opportunity could impact funding eligibility. Students should discuss participation with both the research supervisor and Graduate Programs Coordinator to clarify funding and program status/implications and receive approval. International students will also need to seek guidance from ISSC to ensure eligibility and ensure they remain in good standing regarding their immigration status.

### **Maintaining Satisfactory Academic Progress**

Students must maintain a GPA of 3.0 on the iPOS courses, graduate coursework (500-level and above) and the cumulative GPA (all ASU coursework). The GPA is checked at the end of each semester. A student whose GPA drops below 3.0 on any of the above GPAs is not considered to be progressing in the program satisfactorily and will be placed on academic probation and afforded one semester to bring the impacted GPA to 3.0 or better.

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 [Satisfactory Academic Progress Policy](#) section of this manual and may include the following recommendations:

- The student is placed on 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. MS instead of PhD)
- Recommendation that the student be dismissed from the program

If a student's GPA falls below 2.0 at any time, the Graduate Programs Committee may ask the School Director to write a letter to The College of Liberal Arts and Sciences and the Graduate College recommending immediate dismissal from the 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 select the remaining members of their Supervisory Committee by the end of their second semester. (See procedures in selecting a research advisor and Supervisory Committee described earlier in this section.) Students who have not selected a research advisor by the end of their first semester 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 [Satisfactory Academic Progress Policy](#) section of this manual.

### ***Interactive Plan of Study (iPOS)***

The Interactive Plan of Study (iPOS) is an agreement between the student, SMS and ASU indicating the courses the student will take to complete the degree 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 needs to be completed by the start of the student's third semester in residency. The process of completing and submitting the iPOS is done through the student's MyASU. Instructions for completing the iPOS can be found on the Graduate College's [Plan of Study page](#). See Appendices B and C for additional information on completing the iPOS. The Graduate Programs Coordinator can assist students with the completion of the iPOS. Revisions to the Plan of Study are easily made online and should be made on a yearly basis if needed. The Graduate Programs Coordinator can assist you with this. All courses included on the iPOS, including research and thesis, hours must be completed and show a grade before the MS Degree can be verified and posted by the Graduation Office.

### ***Comprehensive Examination***

All students in the PhD 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 PhD 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 must have completed at least four 500-level courses before taking the exam. Course enrollment for the current semester will count toward the required totals.

The Comprehensive Examination consists of two components: written and oral. The written portion, referred to as the "written exam," is completed first and provided to the Comprehensive Exam committee by **February 22<sup>nd</sup>** for spring exams and **September 23<sup>rd</sup>** for fall exams. Late reports will not be accepted. The oral portion of the examination, referred to as the "oral exam," is a 90-minute examination in which the student presents and defends the written research report. **No oral exam will be administered without receipt of a written exam by the relevant deadline for that semester.** The oral portion, referred to as the oral exam, will be held between March 15 and April 9 for spring exams and October 15 and November 12 for fall exams.

If the written report is not received by the deadline, the student will not be allowed to complete the oral portion of the Comprehensive Examination, forfeiting the first attempt, and will be required to

complete and pass both portions in the following semester. The student will be placed on department academic probation.

The emphasis of the exam will be on:

- Relevant background (state-of-the-art of the field, concepts needed to understand the student's research and major methods used)
- Student's understanding of the significance of the research (why is the research important?).
- Student's understanding of the rationale of the approach or methodology: experimental/computational details and methods, expected outcomes, alternatives, etc
- Student's understanding of the fundamentals of the field in which he/she conducts research. "Fundamentals" might include concepts typically covered in the undergraduate and early graduate curriculum in the student's field as well as fundamental concepts related to the crucial techniques and methods that are commonly used in their research.

Students are encouraged to seek feedback and mentoring on all aspects of the exam. Discussions with research advisors, collaborators, lab members, and others, are encouraged and accepted as long as they do not result in violations of academic integrity policies such as plagiarism. Although research advisors should not, under any circumstances, do the work for the student, they can mentor students on writing and oral presentation skills by attending practice talks and/or criticizing drafts of the written research report.

Students are also expected to demonstrate mastery of the fundamental concepts of chemistry and/or biochemistry that relate to their research, and the student's advisor and advisory committee can provide feedback on which topics the student should focus on.

#### *Academic Integrity*

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. For more information, please refer to the [Academic Integrity](#) section of the handbook (p. 8).

#### *English Language*

Reports should be written in proper English style and grammar. Students are encouraged to visit the [Graduate Academic Support Center](#) for support as necessary. A handout providing information about the timeline, process, and report requirements can be found in Appendix F.

#### ***Written Part of the Comprehensive Examination***

The report should focus on their current research and short-term goals. The long-term goals are part of the prospectus.

The elements listed below should be included, but the actual format of the document is not important as long as students follow accepted practices in their field.

- An introductory section describing the goal of the research (which scientific question(s) are you trying to answer? What hypotheses will you test?\*) , the significance of the work (why is this research important and interesting?), and a description of the state-of-the-art of the field (what is known so far, and what are the open questions?).

\* Note: Not all science is hypothesis driven. Discovery driven research is often appropriate.

- A background section introducing key concepts and techniques that go beyond concepts covered in undergraduate courses in the student's field. For example, a student should not need to explain absorption spectroscopy, but should provide an introduction to a more specialized approach such as pump-probe ultrafast spectroscopy.
- A description of current results, emphasizing the rationale behind the approach used in the student's research, the methods and logic used to interpret results, and conclusions. If experiments did not work as planned, students will provide an explanation of what they learned from their attempts and how they plan to modify the approach. Students will include representations of data (e.g. graphs, tables, images etc.) as needed.
- A conclusion section summarizing the successes so far and a short-term plan to wrap up this part of the project (if not finished yet).

Documents cannot be longer than 10 pages single spaced (not including references), and need to be formatted according to:

- Margins, in all directions, must be at least an inch.
- Font options: Calibri, Arial, Times New Roman, Helvetica, Palatino, Georgia, or a similar font, in a size no smaller than 11. A Symbol font may be used to insert Greek letters or special characters.

References will be included at the end of the document. References can be provided in any style, but they must be complete, including titles.

Documents that do not comply with these requirements will not be accepted. Violation of academic integrity policies are ground for dismissal from the program.

The written portion will be evaluated according to the following criteria:

- Does the document provide a comprehensive introduction, background, current goals, and preliminary results sections?
- Is the document scientifically sound? Are there any obvious mistakes or inaccuracies?
- Are sections, paragraphs, and sentences clearly written and free of ambiguity? Are literature sources appropriately and correctly cited?
- Is the document formatted correctly? Are figures, and tables legible and appropriately described in the text? Do figures help communicate the key points of the document?

The committee will evaluate the document and determine if corrections or additions are needed.

- If the committee determines that the document has numerous deficiencies, the student will have to re-submit a completely revised version of the document before a pre-established deadline. The oral portion of the exam will be halted until the document is re-submitted and the committee agrees it no longer contains serious deficiencies. If the committee determines the second submission still contains serious deficiencies the student will not be allowed to continue in the Ph.D. program.
- If the committee determines that the written document does not require revisions, or requires revisions but has no critical deficiencies, the chair will let the student know they can proceed with the oral part of the exam. If revisions or additions are needed the committee will determine the timeline for the revisions and will provide feedback. If revisions are not satisfactory the committee will decide whether to undergo a second round of revisions. Revisions need to be deemed satisfactory for the student to pass the written part of the comprehensive exam.

### ***Oral Part of the Comprehensive Examination - “Oral Examination”***

The oral part of the Comprehensive Examination, (“oral examination”), is expected to last no more than 90 min. including at least 45 min. of discussion and examination on concepts and relevant background.

Students will be expected to provide a through account of the science underlying their proposed research topic and field and to demonstrate mastery of basic topics in chemistry and/or biochemistry. Students will be questioned in several areas relevant to their development as professional scientists. The successful candidate must clearly demonstrate:

1. Mastery of basic concepts of chemistry/biochemistry relevant for the student’s research.
2. Research proficiency, as evidenced by the progress and productivity level achieved in research including the ability to interpret data, draw conclusions, design experiments or hypotheses, and relate results to what has been established in the literature.

The student should plan his/her presentation to include:

- An introduction with all necessary background that demonstrates mastery of the relevant concepts. Students will introduce key concepts and techniques and will answer conceptual questions about these topics
- A description of research performed to date. Students are expected to emphasize the rationale for the experimental design, expected outcomes, interpretation of results, etc.

The committee will evaluate the student according to the following criteria:

- General chemistry knowledge in the student’s primary field, including methods and equipment/instrumentation used in their research.
- Is the student able to provide a rationale for the experiments attempted (experimental design, expected outcomes, interpretation of results)

- Is the student capable of answering questions at a technical level sufficient to proceed towards a PhD? (critical thinking)
- Has the student made adequate progress? (failed experiments are OK).

The committee will discuss the outcome of the oral examination and communicate the result to the student the same day.

- Students that show serious deficiencies will re-take the oral exam within six months. Detailed feedback including a timeline will be communicated to the student within a week of the exam. Students that show serious deficiencies the second time will not be allowed to continue in the PhD program.
- Students who do not show serious deficiencies *may* be required to complete additional work before the committee can re-assess whether the student passes the oral part of the exam. Examples include, but are not limited to:
  - The student may need to write details about a method or technique to demonstrate proficiency.
  - The student may need to write a few pages explaining certain conceptual details to demonstrate understanding at the PhD level.
  - The student may need to pass a particular graduate-level course with a B or better.
  - The student may need to schedule a meeting with the committee to discuss a well-defined aspect of the student's research

Detailed feedback including a timeline will be provided within a week of the oral exam. Students will complete any extra requirements before the pre-established deadline. The committee will then determine whether the student completed the extra work in a satisfactory manner. If the student does not meet the deadline, or does not complete a satisfactory revision, they will not be allowed to continue in the PhD program.

### ***Results of the Comprehensive Examination***

The Comprehensive Examination Committee will make one of the following recommendations at the conclusion of the Comprehensive Exam.

- Pass: Recommendation to admit to candidacy (pending prospectus approval) for the PhD degree.
- Pass: Recommendation that the student has passed at a level acceptable for an MS degree. Recommend student be allowed to pursue MS degree, but not continue in the PhD program (Graduate Programs Committee will provide information on the requirements).
- Fail: Recommendation that student not be allowed to continue in the PhD program

### ***Documentation of Comprehensive Examination Results***

The Comprehensive Exam Committee will receive the required forms via DocuSign. All completed forms will be sent to the Associate Director of Graduate Programs who will provide students with

the outcome of the written and oral portions of the exam, along with feedback from the committee as well as any requirements for resubmission and any deadlines.

### ***Dissertation Prospectus***

The prospectus will be submitted no later than 6 weeks after the student passes the comprehensive exam. The Prospectus is reviewed and approved by the Supervisory Committee, which includes the student's advisor. The student's advisor will decide whether to hold a meeting with the supervisory committee or whether requesting feedback by email is sufficient.

The prospectus will be a separate document (3-5 pages) expanding the written portion of the exam to include the following:

- An outline of the proposed work to complete the student's dissertation. The prospectus should contain timelines for milestones including graduation. The prospectus should be considered an initial plan and will likely change as the student's research progresses and results shape research direction. Students don't need to revise this document in the future if plans change.
- Students should outline the approach and methods to be used for future work. What experiments are proposed? How will results be analyzed? What are potential pitfalls and alternatives?

### ***Documentation for Reporting Results of Dissertation Prospectus***

The Supervisory Committee will receive the required forms via DocuSign. All completed forms will be sent to the Associate Director of Graduate Programs who will provide students with the outcome of the prospectus.

### ***Annual Meeting with Supervisory Committee***

Students should meet with their supervisory committee annually, with the completion of the Comprehensive Exam and approval of the Dissertation Prospectus serving as the first meeting. Subsequent meetings should be held in fall semesters, with the first meeting to be held in the fall semester in the year following exam completion, i.e. if exam completed in Spring 2022, first meeting would be in Fall 2023.

### ***Technical Review of the Dissertation***

Two to six months prior to the dissertation 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 suggestions for improving any areas that may be problematic or incomplete. The student should prepare a ~30-minute presentation outlining the work to be presented in the dissertation, including a summary of his/her research progress to date and a discussion of any work that is yet to be completed. The committee will question and advise the student to guide him/her in the completion of his/her dissertation and defense. At the conclusion of the Technical Review, committee members should sign the Technical Review for Final PhD Defense form. The form can be obtained from the [Graduate Advising](#) webpage and is sent via

DocuSign to the committee members for signature. A final defense will not be approved for scheduling unless the signed form is on file with the Graduate Programs Coordinator.

### ***Dissertation***

The basic requirement for the PhD 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 PhD degree. For the dissertation to be acceptable, it must contain new and unique contributions to scientific knowledge, publishable in primary research journals. Each student is required to present the results of his/her dissertation during a final oral defense.

The dissertation must follow the Graduate College format guidelines as detailed in the Graduate College [Format Manual](#). Examples of completed PhD dissertations are available in the university library.

### **Steps Toward Graduation and Graduation Requirements**

#### ***Apply for Graduation***

The Graduate College office has firm deadlines for graduation which all students must follow. Information on how to apply and follow the status of your application can be found on the Graduate College [Completing your Degree](#) webpage. It is important to click on the link found on this website titled: “Graduation Deadlines” for information on how and when to meet each deadline date.

There is a checklist on each student’s MyASU page in the My Programs section that lists the items to be completed for graduation. It also shows the status of the student’s graduation application. All documents, with the exception of the final submission to ProQuest, will be submitted within the iPOS.

#### ***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. The date must meet deadlines set by the Graduate College. When the date and time have been established, the student should reserve a conference room for the defense. Conference rooms in the Physical Sciences buildings (C, D, E, H) are reserved in the main School of Molecular Sciences office – PSD 104. (Renovations to the Physical Sciences building’s D and E wings will impact the availability of conference rooms.).

A copy of the dissertation must be submitted to each member of the Supervisory Committee **at least two weeks** prior to the final PhD dissertation defense. The document should be a draft that has been reviewed by the advisor and is ready to defend. **Minor** revisions may be needed following the exam.

#### ***Schedule of Defense Form and Format Review – 10 Day Rule***

Students must meet the Graduate College requirement of submitting a request to hold a final defense at least 10 working days before the planned defense through MyASU. The Graduate College 10 Working Day Calendar must be used to determine the 10 days.

The student selects the “Defense” tab in his/her iPOS page and selects the option to schedule the defense.

The student must also submit the thesis document for format review to the Graduate College at least 10 calendar days prior to the scheduled defense date. The Graduate College [Format Manual](#) guidelines must be followed. The Graduate College has designed a formatting tool, called the “Format Wizard” to assist students with formatting the title page, table of contents, list of illustrations, acknowledgements, etc. The format tool and instructions for using it can be found on the Graduate College [Completing Your Degree](#) page under the “Formatting Your Thesis or Dissertation” link in the menu on the left side of the page. It is suggested that the document is first completed and then cut and pasted into the formatting tool. If format revisions are required, students should make the necessary revisions and resubmit to the format tab in the iPOS until format approval is received. Students should simultaneously complete format revisions and any revisions requested by the committee.

### ***Request to Delay Dissertation Publication***

The student can request that the dissertation document is not made public for a certain period of time in cases involving work of a sensitive nature. This decision should be made after consulting with the advisor or co-advisors. The request for a delay is referred to as an “embargo” and must be requested using the “Delaying Publication of Thesis/Dissertation (Embargo Status) form found on the Graduate College’s Student [Forms](#) page (instructions are also included in the Pass/Fail form). The student also indicates the need for an embargo when the final document is submitted to ProQuest.

### ***Announcement of the PhD Final Defense***

An email announcement of the final defense is sent to all students, faculty and staff in the School of Molecular Sciences. Two weeks prior to the defense, the student must email the following information to the Graduate Programs Coordinator:

- Dissertation Title
- Abstract
- List of Publications
- Name as it should appear
- Committee member names as they should appear
- Date, Time, and Location of Defense.

The student may also request that the announcement be sent to other departments with related research interests.

### ***Final Dissertation Defense***

The final defense of the dissertation must take place by the deadline date specified by the Graduate College. The defense consists of a formal oral presentation of the student’s dissertation, open to the public and approximately 45 minutes in length, 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 "Announcement and Report for Doctoral Dissertation Defense" form provided by the Graduate College via DocuSign. Immediately following the defense, the committee signs to note the outcome and provide an account of any required revisions. Once the required revisions have been completed, the Chair/Co-Chairs sign the form again. If no revisions are required, the Chair/Co-Chairs sign the form again. There are no paper forms to submit, everything is done through DocuSign.

The student will receive a copy of the form following the completion of the first round of signatures and once the form is signed by the Chair/Co-Chairs for the final time.

The Graduate Programs Coordinator receives a copy of the forms and is available as a resource should the student have questions about the status of signatures.

### ***Dissertation Submission***

When the student has successfully completed and passed the final defense, the final revisions of the dissertation document have been approved by the Supervisory Committee Chair, if required, and the document has format approval from the Graduate College, the student submits the dissertation to UMI/ProQuest for publication. (Description and procedure for this process can be found through the link on the student's MyASU Defense tab.) The Graduate College format office reviews the final submission and, if there are no additional corrections, will notify ProQuest the document has received the final approval.

The dissertation is uploaded to the digital repository of the library. Bound copies are no longer provided to the library. Students are not obligated to do so, but may purchase bound copies according to his/her needs – a copy for the research advisor, family members and/or a copy for the student's own reference or library.

Students should be aware that ProQuest can sell the dissertation document through a third party (like Amazon.com) and the student receives no compensation. There is a drop-down menu on the ProQuest form that can be selected to indicate the student's request that the document not be sold through a third party. It will not default to this – the student must select it.

### ***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 or better
- Conducted research at ASU under the direction of a tenured/tenure track faculty member in the School of Molecular Sciences or approved member of the Biochemistry/Chemistry PhD Graduate Faculty
- Written PhD dissertation approved by the Supervisory Committee

- Successfully presented and received a grade of “pass” on the final oral defense of the dissertation.
- Met all deadline dates and requirements as set by the Graduate College.

### **Requirements for the awarding of the Master’s Degree in Passing**

Students who have achieved candidacy status in the PhD 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 MS in Chemistry/Biochemistry 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 PhD in Chemistry/Biochemistry (currently 84 credit hours). Those who already hold an MS in Chemistry/Biochemistry degree from Arizona State University are not eligible to apply. Requirements include:

1. Successful completion of the oral and written parts of the Doctoral Comprehensive Examination required for all PhD students in Chemistry.
2. 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.
  - 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.

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.)

Students also have the option to change to the thesis-based MS degree program.

For students who are exiting the PhD program and seek to complete the Master’s Degree in Passing prior to exit should plan to complete the requirements as early as possible during the final semester to facilitate an easier exit. The steps outlined below cannot be completed until the requirements for the MS degree outlined above have been satisfied. For questions about this process, please consult the Graduate Programs Coordinator.

### ***Paperwork Process for completing the Master’s Degree in Passing***

1. Students should inform the Graduate Programs Coordinator of their intent to pursue the Master’s in Passing so that paperwork can be filed with the Graduate College, who will create a Master’s iPOS.
  - a. The Plan 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.
2. 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.
3. The student presents and defends the Research Portfolio to his/her Supervisory Committee.

4. Committee Members sign the Report of Final Master's Culminating Experience form provided by the Graduate Programs Coordinator. 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.
5. The signed and completed Report of Final Master's Culminating Experience form and a final copy of the completed research portfolio must be submitted to the Graduate Programs Coordinator who will then send a report to the Graduate College notifying them of the completed requirements.

Student will apply for graduation so the MS degree can be conferred. (Process is designed for degree conferral in semester following completion and is requires special consideration to graduate during the semester the requirements are completed.)

### **Satisfactory Academic Progress Policy**

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 must submit a petition to the Graduate Programs Committee requesting an extension to complete the requirement. The petition must include the following information:

- Explanation of extenuating circumstances as to why the requirement cannot be met
- Presentation of a plan and/or outline describing what has been done and will be done to get back on track
- The date(s) as to when the requirement will be completed
- 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 bring it to the attention of the Graduate Programs Committee for review. The petition can be expedited if extenuating circumstances exist. Students will be notified of the committee's decision by email or letter.

Failure to complete a requirement by the specified deadline without having been granted an extension by the Graduate Programs Committee will constitute unsatisfactory performance.

In addition to the academic milestones required by the graduate program, students are expected to conduct research at a level deemed satisfactory by the research advisor. Students who do not perform at the necessary level will be provided feedback by the research supervisor and an action plan will be created in order to improve performance in the research endeavor. Failure to rectify the less than satisfactory performance and maintain satisfactory performance is considered failure to maintain satisfactory academic progress.

Consequences of unsatisfactory performance are detailed in the next section of this manual and may include the following recommendations:

- The student is placed on academic probation until the deficiency is remedied
- Student is advised to find a different Research Advisor

- Revocation of eligibility for Teaching Assistant positions (could negate funding guarantee)
- Revocation of eligibility for Research Assistant position (could negate funding guarantee)
- Recommendation that the student be dismissed from the program

### **Results of Lack of Satisfactory Progress**

Students who are not performing satisfactorily, as demonstrated by a GPA lower than that required for their program, are not meeting the time limits to meet program requirements, or not performing satisfactorily in research will be sent a written notice from the Graduate Programs Coordinator or Associate Director for Graduate Programs 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 Academic Probation or, in some cases, dismissed from the program.

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

*Academic Probation* imposed by the Graduate Programs Committee is not reported to the Graduate College or put on a student's permanent academic record. The consequence of this probation can affect eligibility for financial support from the school. Students on 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 school may not offer a Graduate Assistant position for future semesters. In rare cases, Academic probation may be imposed by the Graduate College, which is separate from the School and could be reflected on the permanent academic record.

*Program Dismissal* occurs when a student has been given notice of poor performance and has not met the requirements given by Graduate Programs Committee to remedy the deficiency within the time limit given. The School Director 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 and given a period of 10 business days to appeal this decision.

A recommendation for immediate dismissal of the student from his/her program may be submitted to the Graduate College as a result of a failed Comprehensive Examination, an academic integrity policy violation, overall GPA remaining below 3.0, semester GPA below 2.0, poor performance in the laboratory (as determined by the student's research advisor and in agreement with Graduate Programs Committee review), failure to satisfy the terms of academic probation, or lack of establishing a Research Advisor and initiating an appropriate research project.

### **Changing Research Advisor and/or Committee Members**

#### ***Research Advisor:***

Changing a Research Advisor is not encouraged, but if circumstances justify the need, it is allowable. 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 School of Molecular Sciences "Change of Advisor" form, which can be obtained from the [Graduate](#)

[Advising webpage](#), should be completed and submitted to the Graduate Programs Coordinator for presentation to the Graduate Programs Committee.

***Supervisory and Comprehensive Examination Committee Member:***

Changing a member or adding a member to the student's Supervisory Committee or Comprehensive Examination Committee (with the exception of the Comprehensive Examination Chair) requires the completion of the School of Molecular Sciences "Change of Committee Member Form". The form can be obtained from the [Graduate Advising webpage](#). The completed form is submitted to the Graduate Programs Coordinator to present to the Graduate Programs Committee.

After a change has been approved at the school 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 (iPOS) so the change can be reflected on the student's official record.

***Comprehensive Examination Committee:***

Requests to change members of the Comprehensive Examination Committee must be submitted to the Graduate Programs Committee and will only be approved in extenuating circumstances. If approved, the Graduate Programs Committee will appoint a new exam committee member – The new committee member will not be selected by the student or the student's Research Advisor.

**Absent Committee Member for the Final Defense**

If a committee member is not able to attend a final defense, either in person or via videoconference, 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 and the Graduate College.

**Responsibilities of Teaching Assistants**

Graduate Teaching Assistants are assigned different roles depending on the qualifications of the individual, the needs of the school, and the funding available each semester. The time commitment is estimated to be approximately 20 hours per week for a full-time (0.50 FTE) position. 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.

Teaching Assistant contacts and coordinators are listed on Appendix G.

The Teaching Assistant Agreement, signed at the time of admission along with the offer letter, contains additional information about the specific duties of the TA position can be found in Appendix H.

Teaching Assistants are evaluated each semester, at both the mid-term and the conclusion of the semester. Results are used to provide feedback on performance to either reinforce positive performance or inform the TA regarding where improvement is needed. Results are considered along with other factors in determining whether a TA is reappointed. The assessment questions provided to students can be found in Appendix I.

Another great resource that outlines the policies of the position is the [TA/RA Handbook](#) that is maintained by the Graduate College.

Failure to perform the duties of the TA position such that the student not able to be appointed to a TA position will require the research supervisor to assume the responsibility for continued funding. In the event the research supervisor is unable to provide funding, the funding guarantee is considered voided until the research advisor is able to secure funds, or TA eligibility is restored.

### **Parental Leave Policy**

Per ASU policy, [ACD 710](#), graduate students with a full-time Graduate Assistant appointment (FTE of .50 or more) who have completed at least one academic year of service are eligible for up to twelve (12) weeks of paid parental leave for the purpose of recovery from childbirth and/or to care for and bond with a newborn or newly adopted child. The student must maintain a minimum enrollment of 6 credit hours in accordance with the TA/RA appointment during the semester the student is requesting the paid leave of absence. The amount of coverage within the twelve-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. This leave is available to both parents (limitations apply if both parents are employed at ASU).

If you have held a TA or RA appointment and are claiming a maternity/paternity benefit, there are additional forms that are required by Human Resources. Students should contact Theresa Shin the School of Molecular Sciences Human Resources Manager, [Theresa.Shin@asu.edu](mailto:Theresa.Shin@asu.edu) or 480-965-7082 for additional information.

The Parental Leave Policy is specific to the Teaching Assistant/Associate and Research Assistant/Associate positions as defined by Human Resources. Students on fellowship or in a GSA (Graduate Service Assistant) position are not eligible for the formal leave as outlined in the policy and should contact their research advisor and the Graduate Programs Coordinator to explore informal leave possibilities.

## **Appendix A – Graduate Programs Committee**

### **Graduate Programs Committee 2021-2022**

#### **Associate Director for Graduate Programs/Chair**

**Marcia Levitus**                      [mlevitus@asu.edu](mailto:mlevitus@asu.edu)

#### **Members**

**Christina Birkel**                      [cbirkell@asu.edu](mailto:cbirkell@asu.edu)

**Abhishek Singharoy**                      [asinghar@asu.edu](mailto:asinghar@asu.edu)

**Petr Sulc**                              [psulc@asu.edu](mailto:psulc@asu.edu)

**Peter Williams**                      [ionize@asu.edu](mailto:ionize@asu.edu)

**Bethany Kolbaba Kartchner  
(graduate student)**                      [bkolbaba@asu.edu](mailto:bkolbaba@asu.edu)

**David Nutt**                              [dnutt1@asu.edu](mailto:dnutt1@asu.edu)

## Appendix B – iPOS Reference

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

The iPOS is an agreement between the student and the School of Molecular Sciences, The College of Liberal Arts and Sciences and the Graduate College outlining how the requirements needed for his/her degree will be met. It is not sent to prospective employers.

While completing the iPOS, keep in mind that it is a “plan” for completing your program requirements and changes, most likely, will need to be made as you progress through your program. Students should discuss course requirements with their Research Advisor and follow the guidelines outlined in the appropriate degree section in the Graduate Programs Handbook. Please consult the [SMS Recommended Plan of Study page](#) for guidance regarding credit enrollment to maximize efficiency and complete the degree requirements in a manner that leverages the TA/RA appointment and allows for reduced enrollment, lower student fees, and additional appointment opportunities later in the program.

PhD students are required to submit the iPOS by the end of their second semester. Students are encouraged to begin discussing courses with the Research Advisor as early as possible. The iPOS should include CHM/BCH 501 for each semester enrolled (up to eight semesters), at least six courses (2-3 credits each), twelve hours of Dissertation (BCH/CHM 799), and research hours (CHM/BCH 792) to bring the total semester hours to at least 84. Student should enroll in research or dissertation credits every semester for which they are conducting research.

MS students are required to submit the iPOS by the end of their first semester. 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 student handbook, six hours of Thesis (CHM/BCH 599) and research hours (CHM/BCH 592) for every semester in which research is performed. 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. These course cannot have been a part of a previously earned degree.

While completing the iPOS, you will need to project courses for several years, and you may not know what courses you want to take or are available. Students are encouraged to speak with their Research Advisor regarding courses. In addition, students can review the course offerings from previous semesters to see what courses have been offered previously as most courses are offered on some sort of rotation, either every fall or spring or every other fall or spring. Remember, you can make changes to the iPOS even after a course is taken. **The Graduate Programs Coordinator can assist with both identifying available courses and completing and submitting the iPOS.**

#### **When the iPOS is complete:**

- Student submits the iPOS for review by the Graduate Programs Coordinator.
- The Graduate Coordinator will submit the iPOS to the Research Advisor for approval.
- When approved the Graduate Programs Coordinator will present the iPOS to the Associate Director or Graduate Program Committee Chair for final approval, and if approved, forward it to the and the Graduate College for processing and final approval (electronic process via the iPOS).

**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 off. If it is a change in courses taken, ask your advisor to send an email to the Graduate Programs Coordinator verifying that the change was approved.

## Appendix C – Committee (MS Programs)

### MS Chemistry and Biochemistry Programs

#### Supervisory Committee



#### MS Program

The research advisor is the Chair of the Supervisory Committee. He/she should be a Member of the Chemistry/Biochemistry Graduate Faculty. A list of the members of the chemistry and biochemistry programs is available at: <https://graduateapps.asu.edu/graduate-faculty>.

Members can be Chemistry/Biochemistry PhD 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. The Supervisory Committee is composed of a Research Advisor (and Co-Advisor if appropriate) and two additional members (can have more than two). **Members cannot be directly involved in the student's research.**

**At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the School of Molecular Sciences.**

## Appendix D – Supervisory Committee (PhD Programs)

### PhD Chemistry and Biochemistry Programs

#### Supervisory Committee



#### PhD Program

The research advisor is the Chair of the Supervisory Committee. He/she should be a Member of the [Chemistry/Biochemistry PhD Graduate Faculty](#). Note that some members of the graduate faculty who are not from the School of Molecular Sciences are not endorsed to chair, so students should always check with the Graduate Programs Coordinator.

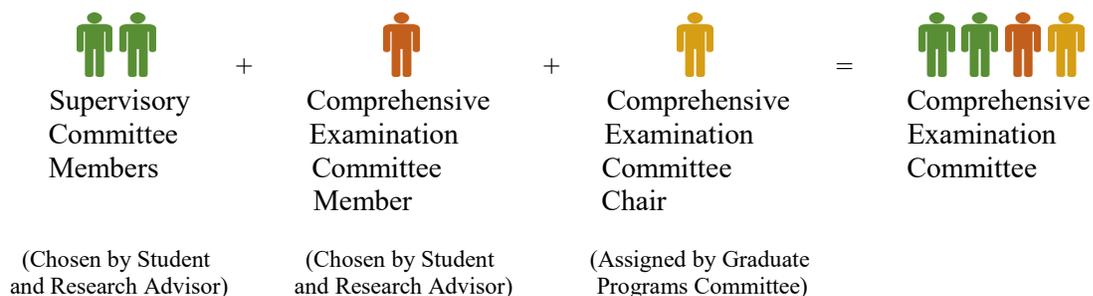
Members can be Chemistry/Biochemistry PhD Graduate Faculty, Emeritus ASU faculty or a tenured or tenure-track faculty member in a science-related field or engineering with the approval of the Graduate Programs Committee. A non-ASU professor or researcher may serve as a Member with approval from the Graduate Programs Committee and the Graduate College. The Supervisory Committee is composed of a Research Advisor (and Co-Advisor if appropriate) and two additional members (can have more than two). **Members cannot be directly involved in the student's research.**

**At least two Members of the Supervisory Committee must be tenured or tenure-track faculty in the School of Molecular Sciences.**

## Appendix E – Comprehensive Exam Committee (PhD Programs)

### PhD Chemistry and Biochemistry Programs

#### Comprehensive Examination Committee



The Chair of the Comprehensive Examination Committee must be a member of the Chemistry or Biochemistry PhD Graduate Faculty 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 PhD 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 PhD 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, a non-tenure-track faculty member, research professional, or non ASU professor or researcher.

## **Appendix F – Comprehensive Exam Process**

**For students admitted after Fall 2019**

**Updated: June 3, 2021**

### **Eligibility:**

Have previously completed four (4) 500-level lecture courses.

Fourth semester of residence in program

### **Timeline:**

#### Spring Exams:

February 22: Written Portion of Exam must be submitted

March 1: Final day to schedule the oral part of the exam.

March 15-April 9: Oral exams need to be completed.

#### Fall Exams:

September 22: Written Portion of Exam must be submitted

October 1: Final day to schedule the oral part of the exam.

October 15-November 9: Oral exams need to be completed.

Any petitions to postpone the exam due to health issues or unforeseen circumstances need to be submitted before January 21 (spring exams) or August 21 (fall exams). Exceptions need to be approved by the Associate Director of Graduate Programs.

### **Possible Outcomes:**

1. Pass: Recommendation to admit to candidacy (pending prospectus approval) for the PhD degree.
2. Pass: Recommendation that the student has passed at a level acceptable for an MS degree. Recommend student be allowed to pursue MS degree, but not continue in the PhD program (Graduate Programs Committee will provide information on the requirements).
3. Fail: Recommendation that student not be allowed to continue in the PhD program

### **Considerations:**

The student's Comprehensive Exam Committee will be comprised of three members chosen by the student and one chair appointed by the Associate Director of Graduate Programs of the School of Molecular Sciences. The student's research advisor/co-advisors are excluded from the committee.

The emphasis of the exam will be on:

- Relevant background (state-of-the-art of the field, concepts needed to understand the student's research and major methods used)
- Student's understanding of the significance of the research (why is the research important?).

- Student's understanding of the rationale of the approach or methodology: experimental/computational details and methods, expected outcomes, alternatives, etc
- Student's understanding of the fundamentals of the field in which he/she conducts research. "Fundamentals" might include concepts typically covered in the undergraduate and early graduate curriculum in the student's field as well as fundamental concepts related to the crucial techniques and methods that are commonly used in their research.

The exam will include a written and an oral portion. Students need to pass both parts of the exam to pass the comprehensive exam. Students are encouraged to seek feedback and mentoring on all aspects of the exam. Discussions with research advisors, collaborators, lab members, and others, are encouraged and accepted as long as they do not result in violations of academic integrity policies such as plagiarism. Although research advisors should not, under any circumstances, do the work for the student, they can mentor students on writing and oral presentation skills by attending practice talks and/or criticizing drafts of the written research report.

Students are also expected to demonstrate mastery of the fundamental concepts of (bio)chemistry that relate to their research, and the student's advisor and advisory committee can provide feedback on which topics the student should focus on.

### **Written Research Report (Written Exam)**

Students should focus on their current research and short-term goals. The long-term goals are part of the prospectus.

The elements listed below should be included, but the actual format of the document is not important as long as students follow accepted practices in their field.

- An introductory section describing the goal of the research (which scientific question(s) are you trying to answer? What hypotheses will you test?\*) , the significance of the work (why is this research important and interesting?), and a description of the state-of-the-art of the field (what is known so far, and what are the open questions?).

\* Note: Not all science is hypothesis driven. Discovery driven research is often appropriate.

- A background section introducing key concepts and techniques that go beyond concepts covered in undergraduate courses in the student's field. For example, a student should not need to explain absorption spectroscopy, but should provide an introduction to a more specialized approach such as pump-probe ultrafast spectroscopy.
- A description of current results, emphasizing the rationale behind the approach used in the student's research, the methods and logic used to interpret results, and conclusions. If experiments did not work as planned, students will provide an explanation of what they learned from their attempts and how they plan to modify the approach. Students will include representations of data (e.g. graphs, tables, images etc.) as needed.
- A conclusion section summarizing the successes so far and a short-term plan to wrap up this part of the project (if not finished yet).

Documents cannot be longer than 10 pages single spaced (not including references), and need to be formatted according to:

- Margins, in all directions, must be at least an inch.
- Font options: Calibri, Arial, Times New Roman, Helvetica, Palatino, Georgia, or a similar font, in a size no smaller than 11. A Symbol font may be used to insert Greek letters or special characters.

References will be included at the end of the document. References can be provided in any style, but they must be complete, including titles.

Documents that do not comply with these requirements will not be accepted. Violation of academic integrity policies are ground for dismissal from the program.

The written portion will be evaluated according to the following criteria

- Does the document provide a comprehensive introduction, background, current goals, and preliminary results sections?
- Is the document scientifically sound? Are there any obvious mistakes or inaccuracies?
- Are sections, paragraphs, and sentences clearly written and free of ambiguity? Are literature sources appropriately and correctly cited?
- Is the document formatted correctly? Are figures, and tables legible and appropriately described in the text? Do figures help communicate the key points of the document?

The committee will evaluate the document and determine if corrections or additions are needed.

- If the committee determines that the document has numerous deficiencies, the student will have to re-submit a completely revised version of the document before a pre-established deadline. The oral portion of the exam will be halted until the document is re-submitted and the committee agrees it no longer contains serious deficiencies. If the committee determines the second submission still contains serious deficiencies the student will not be allowed to continue in the Ph.D. program.
- If the committee determines that the written document does not require revisions, or requires revisions but has no critical deficiencies, the chair will let the student know they can proceed with the oral part of the exam. If revisions or additions are needed the committee will determine the timeline for the revisions and will provide feedback. If revisions are not satisfactory the committee will decide whether to undergo a second round of revisions. Revisions need to be deemed satisfactory for the student to pass the written part of the comprehensive exam.

### **Oral Presentation of Research Report (Oral Exam)**

The oral part of the Comprehensive Examination, (“oral examination”), is expected to last no more than 90 min. including at least 45 min. of discussion and examination on concepts and relevant background.

Students will be expected to provide a thorough account of the science underlying their proposed research topic and field and to demonstrate mastery of basic topics in chemistry and/or biochemistry. Students will be questioned in several areas relevant to their development as professional scientists. The successful candidate must clearly demonstrate:

3. Mastery of basic concepts of chemistry/biochemistry relevant for the student's research.
4. Research proficiency, as evidenced by the progress and productivity level achieved in research including the ability to interpret data, draw conclusions, design experiments or hypotheses, and relate results to what has been established in the literature.

The student should plan his/her presentation to include:

- An introduction with all necessary background that demonstrates mastery of the relevant concepts. Students will introduce key concepts and techniques and will answer conceptual questions about these topics
- A description of research performed to date. Students are expected to emphasize the rationale for the experimental design, expected outcomes, interpretation of results, etc.

The committee will evaluate the student according to the following criteria:

- General chemistry knowledge in the student's primary field, including methods and equipment/instrumentation used in their research.
- Is the student able to provide a rationale for the experiments attempted (experimental design, expected outcomes, interpretation of results)
- Is the student capable of answering questions at a technical level sufficient to proceed towards a PhD? (critical thinking)
- Has the student made adequate progress? (failed experiments are OK).

The committee will discuss the outcome of the oral examination and communicate the result to the student the same day.

- Students that show serious deficiencies will re-take the oral exam within six months. Detailed feedback including a timeline will be communicated to the student within a week of the exam. Students that show serious deficiencies the second time will not be allowed to continue in the PhD program.
- Students who do not show serious deficiencies *may* be required to complete additional work before the committee can re-assess whether the student passes the oral part of the exam. Examples include, but are not limited to:
  - The student may need to write details about a method or technique to demonstrate proficiency.
  - The student may need to write a few pages explaining certain conceptual details to demonstrate understanding at the PhD level.
  - The student may need to pass a particular graduate-level course with a B or better.
  - The student may need to schedule a meeting with the committee to discuss a well-defined aspect of the student's research

Detailed feedback including a timeline will be provided within a week of the oral exam. Students will complete any extra requirements before the pre-established deadline. The committee will then

determine whether the student completed the extra work in a satisfactory manner. If the student does not meet the deadline, or does not complete a satisfactory revision, they will not be allowed to continue in the PhD program.

### **Dissertation Prospectus**

The prospectus will be a separate document (3-5 pages) expanding the written portion of the exam to include the following:

- An outline of the proposed work to complete the student's dissertation. The prospectus should contain timelines for milestones including graduation. The prospectus should be considered an initial plan and will likely change as the student's research progresses and results shape research direction. Students don't need to revise this document in the future if plans change.
- Students should outline the approach and methods to be used for future work. What experiments are proposed? How will results be analyzed? What are potential pitfalls and alternatives?

The prospectus will be submitted no later than 6 weeks after the student passes the comprehensive exam. The Prospectus is reviewed and approved by the Supervisory Committee, which includes the student's advisor. The student's advisor will decide whether to hold a meeting with the supervisory committee or whether requesting feedback by email is sufficient.

## **Appendix G – TA Contacts**

### **TA Contacts and Coordinators**

**Dr. Ron Briggs** – PSH-240 – [ronbriggs@asu.edu](mailto:ronbriggs@asu.edu) – 480-965-1905

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. Smitha Pillai** – PSC-202 – [smitha.pillai@asu.edu](mailto:smitha.pillai@asu.edu) – 480-965-3581

Coordinates the Organic Chemistry laboratory program and is responsible for TA assignments in the Organic Chemistry courses.

**Dr. Scott Lefler** – PSH-237 – [slefler@asu.edu](mailto:slefler@asu.edu) – 480-727-8282

Coordinates the Biochemistry laboratory program and is responsible for TA assignments in the Biochemistry courses.

**David Nutt** – PSB 261 – [dnutt1@asu.edu](mailto:dnutt1@asu.edu) – 480-965-4664

Coordinates all aspects of the SMS graduate programs (including TA offer letters and orientation)

**Theresa Shin** – PSB 243 – [theresa.shin@asu.edu](mailto:theresa.shin@asu.edu) – 480-965-7082

Manages the hiring paperwork and payroll processes.

**John Crozier** – PSD-001 – [jcrozier@asu.edu](mailto:jcrozier@asu.edu) – 480-965-5492

Oversees all safety measures and ensures compliance in all classes and labs.

**Beatriz Smith** – PSH-233 – [beatriz.smith@asu.edu](mailto:beatriz.smith@asu.edu) – 480-965-2726

Coordinates new TA training and manages the general chemistry laboratories.

## Appendix H – Teaching Assistant Agreement



### Graduate Teaching Appointment Agreement

Graduate Teaching Appointments are available to students in the Chemistry/Biochemistry Graduate Programs based on the original admissions offer letter. This agreement is for the duration of your graduate program and is contingent on satisfactory academic standing, performance and Teaching Assistant evaluations in addition to the achievement and maintenance of satisfactory spoken English proficiency via the SPEAK test and continued improvement. Failure to pass the SPEAK test within 1 year will result in the loss of TA appointment privileges.

ASU stipends are paid biweekly. Benefits of this appointment include coverage of tuition and individual health insurance through a waiver that is applied to the student account to cover the costs. You must be enrolled as a full time student (min. 6 hours) and maintain at least a 3.0 grade point average. If you need health insurance, you will need to select that option when registering for classes – if you decline, you will be without coverage through ASU. If you have applied for and/or received financial aid, acceptance of this assistantship may decrease your financial aid funding eligibility. Additional information concerning graduate assistantship positions can be found at: <https://graduate.asu.edu/ta-ra-handbook>.

The time commitment is estimated to be approximately 20 hours per week for a full-time (50% FTE) position. If at any time the assignment consistently exceeds 20 hours per week, you should contact the TA Coordinator. You will be under the direct supervision of the faculty member teaching the class you are assigned and the TA Coordinator for the School of Molecular Sciences. You may not hold outside employment at the same time that you hold this position. All absences must be approved prior to the event and you must make arrangements for another TA to serve as a substitute during your absence. This substitute must be approved by the TA Coordinator. In cases where prior notice cannot be given, you must notify your immediate supervisor and the TA Coordinator as soon as possible. Teaching Assistants appointments begin with attendance at a general TA meeting which is held prior to the first day of class each semester and ends when final grades are submitted and final tasks completed. This appointment is binding and you may only be released from your teaching obligation upon approval of the TA Coordinator.

Duties for this position may include any combination of the following:

- Discuss lab procedures and course related topics
- Instruct and monitor students on lab experiments and procedures
- Enforce safety procedures
- Prepare quizzes, grade quizzes, tests, lab reports and various other assignments
- Hold office hours
- Attend weekly staff meetings
- Maintain grade books and submit grades by date specified by instructor and/or TA Coordinator
- Proctor and grade examinations
- Provide general assistance in the instructional process
- Prepare lab materials for demonstrations
- Setup experiments
- Attend lecture sessions
- Miscellaneous duties associated with the position

All new Teaching Assistants are required to attend and complete the Teaching Assistant Development (TAD) training conducted by Graduate Education as well as the TA training program offered through the School of Molecular Sciences.

I have read and understand the requirements for a Teaching Assistant Position

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

**School of Molecular Sciences**  
PO Box 871604 Tempe, Arizona 85287-1604  
(480) 965-3461 Fax: (480) 965-2747  
sms.asu.edu

## **Appendix I – TA Evaluation**

1. My TA is well prepared for class.
2. My TA discusses course material in ways I understand.
3. My TA is helpful when I am confused and ask for help.
4. My TA encourages effective cooperation within lab groups.
5. My TA provides sufficient opportunity for me to ask questions.
6. My TA holds my attention and interest during class discussions.
7. My TA speaks clearly and is easy to understand.
8. My TA clearly explains and enforces safety procedures among students.
9. My TA follows safety procedures themselves.
10. My TA maintains good control and supervision of the laboratory.
11. My TA follows course grading policies.
12. My TA grades my work fairly and with sufficient feedback.
13. My TA returns graded material in a timely manner (typically by the next lab period).
14. My TA started and ended our lab section on time.
15. My TA was available during posted office hours.
16. My TA has developed good rapport with students.
17. My TA is knowledgeable about the course material.
18. My TA is enthusiastic about teaching.
19. In future courses, I would like to have the same TA again.
20. Explain how your TA was effective in helping you learn laboratory concepts and techniques.  
(short answer)
21. What suggestions do you have to help your TA improve for future courses? (short answer)