

# STUDENT HANDBOOK

# MOLECULAR BIOSCIENCES GRADUATE PROGRAM

Revision July 2020

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COLLEGE OF SCIENCES & MATHEMATICS

Graduate Program in Molecular Sciences | P.O. Box 847, State University, AR 72467 | o: 870-972-2007 | f: 870-972-2008

Dear Students:

Welcome to Arkansas State University and the Graduate Program in Molecular Biosciences. We are pleased that you have selected our program in Molecular Biosciences (MBS). We would also like to congratulate you for being admitted to this very rigorous program. As you know, the application process is competitive and your admission should serve as evidence of your potential to develop as an independent researcher. We look forward to your participation in our program.

This handbook is intended to assist you in navigating your way through the MBS program. However, experience has taught us that questions and problems will arise. Your Research Advisor and Advisory Committee members will be a valuable asset as you progress through the program. Please take advantage of their experience and expertise.

Again, welcome to the program and we wish you every success. Should you have questions, my door is always open.

Best wishes,

Tanja McKay, Ph.D.

Director of Graduate Program in Molecular Biosciences

## **PREFACE**

The ***A-State Graduate Bulletin***, the ***A-State Student Handbook*** and other guidelines referenced herein are the primary sources of information regarding academic and research policies and procedures at A-State. This ***Handbook*** is a supplement designed specifically for MS and PhD students in the Molecular Biosciences Program and does not replace or preempt the information provided in the previously listed publications. All MBS students are responsible for being informed about all academic and research requirements. MBS faculty members are available for advice, guidance, and consultation regarding all requirements, policies, and procedures.

## SECTION I. Program Overview and Student Progression

### A. PROGRAM OVERVIEW

The Graduate Program in Molecular Biosciences at Arkansas State University encompasses the areas of biotechnology, cell biology, computational biology, immunology, food safety, neurobiology, chemical ecology, bioproduction, regulation of gene expression, signal transduction and cellular metabolism, and structural biology. The MBS graduate program trains highly qualified students for productive careers in research and teaching through the completion of the MS or PhD degree. There are a series of course work, research project evaluations and examinations designed to prepare and test the student's potential for success in the program. Talk to your advisor to ensure that you know the steps and the importance of each. In general there is a Thesis/Dissertation research proposal to be prepared and defended, course work to be completed, and ultimately defense of a thesis/dissertation on completion of the research project.

### B. PHD DEGREE IN MOLECULAR BIOSCIENCES

The table below outlines the process which is discussed in more detail in the following paragraphs. Forms mentioned in this table are available on the MBS website <https://www.astate.edu/college/sciences-and-mathematics/doctoral-programs/molecular-biosciences/documents/> and from the MBS office.

<b>PhD Program in Molecular Biosciences</b>		
<b>TIMELINE</b>	<b>EVENT</b>	<b>ACTION</b>
Before first semester	Select Advisor	Most MBS students will have entered the program having already chosen a Research Advisor.
By end of 2 <sup>nd</sup> semester	1. Select a PhD Advisory (Dissertation) Committee	1. Submit <i>Request for the Selection of a PhD Advisory (Dissertation) Committee</i> form ( <b>Form 1</b> )
By end of 1 <sup>st</sup> year	1. Program of study approved by PhD Advisory Committee  2. Set date for Qualifying Exam (Dissertation Proposal Defense)	1. Submit <i>Proposed Program of Study</i> form to MBS office ( <b>Form 2</b> )  2. Submit <i>Qualifying (Dissertation Proposal Defense) Examination Intent</i> form to MBS office ( <b>Form 3</b> )
During 3 <sup>rd</sup> semester	1. Dissertation Research Proposal to Committee  2. Qualifying Exam (Dissertation Proposal Defense) public defense	1. The Dissertation Research Proposal is focused on student's intended research. <u>Submit Seminar Announcement to MBS office two weeks prior to presentation</u>  2. After successful defense, submit <i>Qualifying Examination (Dissertation Proposal Defense) Report</i> form ( <b>Form 4</b> ) to MBS office

<p>Within 1 year of passing Qualifying Exam</p> <p>5<sup>th</sup> or 6<sup>th</sup> semester</p>	<p>1. Set date for Candidacy Exam (public defense of research proposal) to Committee;</p> <p>2. Candidacy Exam (Research Proposal) public defense</p> <p>Publication of research results</p>	<p>1. The Candidacy Exam or the Research Proposal (outside of field of study) must be on research outside student's dissertation research area. <u>Submit Seminar Announcement to MBS office two weeks prior to presentation</u></p> <p>2. Submit <i>Candidacy (Research Proposal Defense) Examination Intent</i> form (<b>Form 5</b>).</p> <p>3. After successful defense submit <i>Report of Examinations and Requirements with Recommendation for Advancement to Candidacy</i> form (<b>Form 6</b>) to MBS office</p> <p>Begin writing and submitting manuscripts on your research results</p>
<p>By the end of the 8<sup>th</sup> semester (last semester)</p>	<p>1. Dissertation to Committee (21 days before defense date); Schedule public defense of dissertation</p> <p>2. Dissertation Defense</p>	<p>1. Submit <i>PhD Dissertation Defense &amp; Examination Intent</i> form (<b>Form 7</b>) to MBS office. <u>Submit Seminar Announcement to MBS office two weeks prior to presentation</u></p> <p>2. After successful defense, submit <i>Dissertation Defense &amp; Examination Report</i> form (<b>Form 8</b>) to MBS office</p> <p>3. At the beginning of the semester in which you intend to graduate, complete the <u>Online Intent to Graduate Form</u>. This form is available at <a href="http://registrar.astate.edu/intent-instructions.pdf">http://registrar.astate.edu/intent-instructions.pdf</a></p> <p>4. Submit <i>Dissertation Approval</i> form (<b>Form 9</b>) to the MBS office</p> <p>5. After <i>Dissertation Approval</i> form has been signed by the Dean of the College of Science and Mathematics, submit dissertation through ProQuest</p>



There are a series of projects and examinations designed to prepare and test the student's potential for success in the PhD program. The student should talk to their advisor to ensure the proper steps are followed. In general there is a dissertation research proposal to be prepared and defended, course work to be completed, and ultimately defense of a dissertation. The table above outlines the process which is discussed in more detail in the following paragraphs.

### **C. PhD COURSE REQUIREMENTS**

Molecular Biosciences has a number of course requirements that are required:

#### **Ethics and Responsible Conduct in Research**

(Select one of the following)

MBS 7151 Responsible Conduct in Research

BIO 5063 Biosafety and Ethics in Research

#### **Seminar Courses** (Every semester)

MBS 7111 Seminar in Molecular Biosciences

#### **Cell Biology**

MBS 6213 Advanced Cell Biology

#### **Biochemistry**

MBS 6233 Specialized Biochemistry

#### **Genetics and Genomics**

MBS 6243 Molecular Genetics and Genomics

#### **Techniques Courses** (Four semesters)

MBS 6251 Techniques in Molecular Biosciences

#### **Dissertation** (18 hours after attaining Candidacy)

MBS 889V Dissertation

Substitution of equivalent courses may be made upon the recommendation of the PhD Advisory Committee with the approval of the Director. In addition, each will normally take courses in their specialty area sufficient to bring the total number of credits to the minimum of 72 required for the PhD in Molecular Biosciences beyond the bachelor's degree or 42 beyond the master's degree. Any additional course work requirements will be determined by the PhD Advisory Committee to meet the student's specific program needs.

#### Additional Courses Offered:

MBS 6001 Fundamentals of Entrepreneurship for Scientists

MBS 712V Topics in Molecular Biosciences

MBS 713V Independent Study in Molecular Biosciences

MBS 7251 Mentored Teaching

If students have not previously written a proposal during their MS degree, it is strongly encouraged that students take **BIO 6003 Scientific Methods and Research Design**.

PhD students are encouraged to take **MBS 7251 Mentored Teaching** and a statistics course.

### **PhD Minor in Statistics**

Arkansas State University offers a PhD Minor in Statistics. This minor is designed to give graduate students in doctoral programs a rich foundation and core competency in statistical design and analysis skills, and to provide education and training for interested students whose doctoral research includes a substantial amount of statistical methodology or data analysis. These students will benefit from a broad and enriched perspective in the fundamentals and applications of statistics. The Minor in Statistics distinction should enhance employment opportunities for students who have an interest in a research career, be it academic or government/business oriented.

The PhD Minor in Statistics requires at least 12 hours of 6000-level courses with a STAT prefix. A grade of B or better must be earned in each course counted toward the minor. STAT courses which satisfy requirements of the student's graduate program may also count toward the Minor in Statistics. In addition to course work, students must demonstrate the ability to apply statistical methodology to problems in research. Sections or chapters of a dissertation can provide such a demonstration. Administration of the PhD Minor in Statistics is through the Department of Mathematics and Statistics. A member of the statistics faculty must be on the student's graduate Advisory Committee.

## **D. PhD KEY CONCEPTS**

### **D-1 General Advisor**

General Advisor: Students who are not recruited to work with a specific advisor or who did not identify an advisor at the time of application will be assigned a "general advisor". This faculty mentor will be a member of the Program Committee and will be cognizant of all program policies and regulations. The "general advisor" will be assigned to the student before his or her arrival and will meet with the student prior to the start of the first semester in residence to provide information about program policies, expectations, and to develop a basic program of study plan that will be followed until the research advisor has been selected. Some of the responsibilities which can be assumed by the "general advisor" are:

1. Advising students on their course program and discussion of specialty area requirements.
2. Working with the student to identify a research advisor.
3. Serving as a point of contact for the student throughout their program of study.
4. Ensuring that the student is aware of program policies, procedures, and regulations.
5. Ensuring that the student gets a broad range of learning experiences.
6. Reviewing student performance as a teaching assistant as well as in courses.
7. Recommendations to the Graduate Program Committee regarding a student's progress.

Graduate students are encouraged to look up the research interests of MBS faculty members, seek appointments to discuss their research and identify an advisor.

### **D-2 PhD Research Advisor**

A student must select a permanent Research Advisor by the end of the first semester. Students who fail to choose a permanent research advisor before the second week of the second semester in the program jeopardize their academic standing in the program. If a research advisor is not selected by the end of a student's second semester, the student risks dismissal from the program. After consultation with the Research Advisor, the *Selection of a PhD Advisor (Dissertation) Committee form (Form 1)* is filed in the MBS office.

The Research Advisor will often, but not always, be a member of the specialty area nearest to the student's research interests. The Research Advisor automatically becomes chair of the PhD Advisory Committee and assumes primary responsibility for advising the student on coursework and other academic matters.

Program policy limits the total period of time for which any one student can hold a Graduate Assistantship. Therefore, it is important and entirely appropriate for you to inquire about and consider carefully the ability of a given potential faculty advisor to support new students entering their research group. Feel free to ask faculty about details of how long the average student has spent earning the degree in that group in the past and how many semesters of support were provided by the program, a teaching assistantship from the host department and as a research assistantship funded by extramural grants. You should inquire about existing and pending research grants of the faculty member and about fellowships and scholarships available from external sources for which you are eligible to apply.

Changing a research advisor: Changing a research advisor after beginning a program of study can be done, but is often not in the student's best interest. If such a change is necessary, students must consult with the MBS Program Director before initiating the change. The student will then submit the *Petition to Change Research Advisor* form. This form is available from the MBS Office.

### **D-3 PhD Advisory Committee**

No later than the end of the second semester in residence, prior to taking qualifying examinations, each student and his or her Advisor should assemble a PhD Advisory Committee. PhD Advisory Committees are comprised of a minimum of five members of which one may be external to the institution. After consultation with the Research Advisor and with prospective Advisory Committee members, the *Request for the Selection of a PhD Advisory (Dissertation) Committee (Form 1)* is filed to request formation of a research committee. The PhD Advisory Committee's responsibilities include, but are not limited to:

1. Advising students on their program of study and discussion of specialty area requirements.
2. Determining the nature of the qualifying and candidacy examinations, establishing deadlines for those examinations and ensuring that deadlines are met.
3. Ensuring that each student receives an appropriate range of learning experiences.
4. Reviewing performances in teaching, course work, examinations, and research.
5. Recommendations to the MBS Program Committee regarding a student's progress.
6. Recommending to the Director of the Graduate Program in Molecular Biosciences the inclusion or exclusion of previous graduate level coursework as part of the Program of Study.
7. Assist the research advisor in guiding the students dissertation research, evaluating the research, determining if the research is appropriate for earning the PhD degree in Molecular Biosciences, recommending the student for admission to candidacy and ultimately, recommending the student for the PhD degree.

Changes in the PhD Advisory Committee: To petition for a change in the membership of their PhD Advisory Committee the student MUST gain approval of the MBS Program Director. The student will then submit the petition to *Change PhD Advisory Committee* form (**Form 10**). This form is available from the MBS Office and must be submitted with the reason for the request and must include the signatures of the advisor, the faculty member who is to be added to the committee, and, if possible, the member who is being replaced. Since the members of the Ph.D. Advisory Committee are chosen because of their expertise that is necessary to advise the student appropriately in their research, it is almost always necessary to replace the member who is no longer available with a new member, often with similar expertise so that the student's research does not suffer due to lack of expertise. Be aware that it is virtually impossible (by A-State policy) to change the membership of the PhD Advisory Committee between an initially failed qualifying or candidacy examination and the retake (if permitted) of the exam.

Students and faculty alike should consider this in their planning when faculty will be on leave in the semester/year subsequent to the first examination date. The A-State Policy also requires that a minimum of ten weeks pass before retaking a qualifying exam.

The MBS Program recommends a minimum of one formal meeting of the student, their Research Advisor and their PhD Advisory Committee each semester. Each spring semester, the student will be responsible in submitting a progress report to the MBS Office. Usually beginning in February, the MBS Director will send out two documents: the *MBS Student Annual Progress Report Form* and the *MBS Research Expectations Rubric*. The student will meet with their Research Advisor and get feedback from their Advisory Committee on how they are progressing in the program. A letter from the Research Advisory should also be attached to the progress report when submitted.

It is important for faculty to provide students with timely and candid advice when their performance is deficient or their lack of progress might prevent them from attaining the desired degree. This recommendation assumes that many other informal and frequent meetings between the Research Advisor and the student occur, often on a weekly or more frequent basis. In addition, students are strongly encouraged to also seek more frequent interaction with the members of their PhD Advisory Committee.

#### **D-4 PhD Program of Study**

The *Proposed Program of Study for the Doctoral Degree* form (**Form 2**) lists the courses that will be taken during the student's course of study. These courses include required and elective courses that you are expected to successfully complete. A minimum of 72 graduate credits beyond the baccalaureate degree or 45 graduate credits beyond the master's degree is required for graduation. The PhD Advisory Committee is responsible for determining which courses are needed; thus, the Program of Study will be individually designed for each student. If changes in the Course of Study become necessary, they must be approved by the PhD Advisory Committee and a revised version of the *Proposed Program of Study* form submitted to the MBS Program office. This form is available on the MBS website and should be completed after your course of study has been approved by your Research Advisor and PhD Advisory Committee. All candidates for a Ph.D. degree in Molecular Biosciences are required to complete or have completed the specified core courses and elective courses, or their equivalent, as directed by the student's Doctoral Advisory Committee. Each Ph.D. student must complete a minimum of 15 hours of Molecular Biosciences approved course work (including the specified 9 credits in Core courses, 1 credit in Responsible Conduct in Research and 4 credits from the Techniques in Molecular Biosciences course). Students must also take the Seminar in Molecular Biosciences every semester plus a minimum of 18 hours of dissertation research credits along with any other academic studies required by the student's Doctoral Advisory Committee. In addition MBS students are required a minimum of two semesters of teaching as arranged in coordination with the Research Advisor, the Program Director and the Chair of the Department in which they will be teaching. If a PhD student is supported through a Graduate Assistantship, the student is expected to teach one lab each fall and spring while on program funds.

#### **D-5 Dissertation Proposal Defense (Qualifying Examination)**

The purpose of the Qualifying Examination is to evaluate whether the student has begun to acquire the skills necessary to complete and defend a Ph.D. dissertation appropriate to the student's degree plan. These skills are demonstrated by the preparation of a written document which describes the background, current status of the student's research problem, and a description of the experimental approach in investigating the research problem followed by a public defense of that proposal and an oral examination conducted by the PhD Advisory Committee. The oral proposal defense is a brief (typically 30-40 min) public presentation of the student's research proposal with a follow-up period for questions from the general audience. This is followed by a closed door proposal examination conducted by the PhD Advisory Committee. In addition to specific questions about the proposal, the committee may explore other topics such as knowledge gained from coursework, seminars, and current literature or other matters of timely interest to Molecular Biosciences.

The Qualifying Examination must be scheduled by the third semester of the student's program. Before submitting the *Qualifying (Dissertation Proposal Defense) Examination Intent* form (**Form 3**), a draft of the

Dissertation Proposal that has been approved by the Research Advisor must be submitted to all members of the PhD Advisory Committee for their review. Form 3 must be submitted to the MBS Program office at least 14 days before the scheduled defense. After successful completion of the Qualifying Examination the *Qualifying Examination (Dissertation Proposal Defense) Report* form (**Form 4**) must be submitted to the MBS Program office. If performance on the Qualifying Examination is judged inadequate by the PhD Advisory Committee they may:

- 1) Require the student to repeat the exam,
- 2) Require the student to pass a written examination,
- 3) Require the student to repeat the oral exam and pass a written exam, (Note that it is required that at least 10 weeks pass before the Qualifying Examination can be repeated.) or
- 4) Recommend that the student be dismissed from the program.

If a second attempt to pass the Qualifying Examination is unsuccessful, the student will be dismissed from the program. If the PhD Advisory Committee feels that the student would benefit from additional course work, they may also require the successful completion of additional courses. If the Qualifying Examination is not passed the PhD Advisory Committee may decide not to submit the *Qualifying Examination (Dissertation Proposal Defense) Report* Form.

#### **D-6 Research Proposal Defense (Candidacy Examination)**

Within one year of successfully passing the Qualifying Examination, each student must prepare and defend a hypothesis-driven research proposal (approximately 15 pages in length) outside the area of his or her dissertation project. The topic of the proposal must be approved by the student's PhD Advisory Committee, and follow the format of a National Science Foundation (see page limits and details at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg)) or National Institutes of Health (see page limits and details at <http://grants.nih.gov/grants/funding/424/index.htm>) proposal. However, the PhD Advisory Committee may specify the format used by another federal funding agency. Successful completion of this Candidacy Examination and completion of required course work will qualify the student for Candidacy to the Ph.D. in Molecular Biosciences. The format of the Candidacy Examination is identical to that of the Qualifying Examination.

Before submitting the *Candidacy (Research Proposal Defense) Examination Intent* form (**Form 5**), a draft of the Research Proposal that has been approved by the Research Advisor must be submitted to all members of the PhD Advisory Committee for their review at least 14 days before the scheduled defense. Form 5 must also be submitted to the MBS program office at least 14 days before the defense. After successful completion of the Candidacy Examination the *Report of Examinations and Requirements with Recommendation for Advancement to Candidacy* form (**Form 6**) must be approved by the MBS Program Director, the Dean of the College of Sciences and Mathematics and submitted to the Registrar's Office. If performance on the Candidacy Examination is judged inadequate by the PhD Advisory Committee, they may:

- 1) Require the student to repeat the exam, **OR**
- 2) Recommend that the student be dismissed from the program

If the student fails to successfully complete the Candidacy Examination in the second attempt, the PhD Advisory Committee will recommend that the student be dismissed from the MBS Program.

#### **D-7 Advancement to PhD Candidacy**

By the end of the 5<sup>th</sup> or beginning of 6<sup>th</sup> semester in residence, a number of program requirements should be successfully completed for advancement to PhD Candidacy. These include the following:

- i. Appointment of Dissertation Advisory Committee
- ii. Proposed Program of Study

- iii. Research Proposal Defense (Candidacy Examination)
- iv. Passing the dissertation proposal seminar and defense
- v. Completing the PhD core course requirements
- vi. The student cannot be on probation and must have a G.P.A. greater than 3.00

The Research Advisor and the members of the Advisory Committee must recommend the student for advancement to candidacy status. The student must file the *MBS Report of Examinations and Requirements with Recommendation for Advancement to Candidacy (Form 6)* with the MBS Program office. This form will then be submitted to the Registrar.

#### **D-8 Dissertation Seminar and Defense**

After completing an extensive research project approved by the Research Advisor and PhD Advisory Committee, the student is required to present the written dissertation to his or her PhD Advisory Committee, and hold the final public defense. The format of this defense is identical to those of the Qualifying and Candidacy Exams, however, the public defense is usually somewhat longer (45-50 min). All members of the PhD Advisory Committee must be in attendance. In the case of an emergency that prevents a member from attending they may participate by conference call. If a member cannot attend or participate by conference call, the MBS Program Office must be notified at least two weeks in advance of the member's proxy. Questions provided by the absent member must be asked by the proxy, and answers recorded for review by the absent member.

This defense must be completed 4-6 weeks before the deadline for submission of the Dissertation to the Registrar's Office (<http://www.astate.edu/a/graduate/>). Before submitting the *PhD Dissertation Defense & Examination Intent* form (**Form 7**), a draft of the Dissertation that has been approved by the Research Advisor must be submitted to all members of the PhD Advisory Committee for their review at least 21 days before the scheduled defense. Form 7 must be submitted to the MBS Program office and the Registrar's Office at least 4 weeks before the scheduled defense. After successful completion of the Dissertation Defense the *Dissertation Defense & Examination Report* form (**Form 8**) must be approved by the MBS Program Director, the Dean of the College of Science and Mathematics and submitted to the Registrar's Office. If the student fails to successfully complete the Dissertation Defense the PhD Advisory Committee will usually recommend that the student be dismissed from the MBS Program. It is the student's responsibility to contact all members of the PhD Advisory Committee regarding their willingness to give the final oral examination. All signatures should be obtained before the final acceptance of dissertation form is submitted to the Registrar's Office.

#### **D-9 Dissertation**

Each semester the Academic Affairs/Registrar's Office establishes a deadline for submission of completed dissertations. **The dissertation cannot be submitted to ProQuest before the *Dissertation Approval* form (Form 9) has been signed by the PhD Advisory Committee members, the MBS Program Director and the Dean of the College of Sciences and Mathematics.**

The dissertation must adhere to Arkansas State University's guidelines and must contain:

- 1) **Introduction.** This chapter should contain an extensive review of literature that demonstrates that the student understands the current research in their area and can place their research into historical and scientific context. This chapter may also contain information about specific techniques used in the conduct of the research and is usually the longest chapter of a dissertation. If material in the introduction was published as a review article of which the student was an author, this chapter should be preceded by an authorship/publication statement (see below). Student-authored review articles may not be copied verbatim.

2) **Research Chapters.** The introduction is followed by several (usually 3-5) chapters that describe specific research projects.

a) **Peer-review publication.** *The contents of at least one or more of these chapters must be from a peer-reviewed journal article that contains the student as primary author. This applies to all the MBS PhD students.* (Note: under unusual circumstances the PhD Advisory Committee may petition the MBS Program Committee to waive this publication requirement. This request should provide a detailed explanation of why the waiver is necessary and be signed by every member of the committee. Such waivers will only be granted when the proprietary nature of the research or requirements by the funding agency do not permit any publication. Therefore, if a waiver is deemed necessary the request must be submitted to the MBS Program Committee at least **one year prior** to the dissertation defense).

Prior to a manuscript being submitted to a journal, the student will submit the intended manuscript to their advisory committee for review if that manuscript will be part of the dissertation. Each committee member on the Advisory Committee needs to provide edits and feedback to the student. Therefore the student will be required to send the manuscript to their committee at least three weeks prior to the submission to the journal. If the student does not receive edits and feedback from a committee member by day 21, they may proceed in submitting the manuscript to the journal.

All of these chapters should be organized as for submission to a relevant scientific journal and should contain an abstract, introduction, materials and methods, results and discussion sections. With the exception of the bibliography (references cited) published chapters may be copied as published if the student was the first author of the published article. However the chapters should read as connected to the main focus of the research and not as dis-jointed chapters. Also it is important in the thesis references follow the same format throughout the thesis although individual journals where the chapters were published could have required a different format for bibliography. Published articles which the student was not first author may not be so used. Review articles should not be included in this section, but material from published review articles is appropriate for inclusion in the Introduction. Each of these chapters must be preceded by:

i) Authorship/Publication Statement. This information should specify whether the article is published, "in press", "in review", has been submitted or is in preparation. All co-authors and their institutional affiliations must be included. If the article has not yet been submitted, this statement should include co-authors and the target journal. If any of the material in the chapter has been presented as a poster or talk at a scientific meeting, that information should also be included in this statement.

ii) If the chapter has been published, it must also be preceded by a copyright statement. If the corresponding author (usually the Research Advisor) is not the copyright holder of the published article, permission to use the material must be obtained from the copyright holder. A statement showing that the student holds the copyright or that the corresponding author (acting on behalf of all the co-authors) holds the copyright or has received permission to use the material must be placed at the beginning of each chapter containing previously published material.

3) **Conclusion and Perspectives (Future Directions).** This chapter should summarize the research, describe the unifying theme of the research, and highlight the most important findings of the research and how they contribute to the field. Research results should also be discussed in the context of the published results of similar research. It should also contain a discussion of the importance and relevance of the research, prospective experiments or suggestions for future direction of the research.

4) **References Cited.** References can be organized at the end of each chapter or the final chapter of the dissertation can contain the references cited in all chapters of the dissertation. These may be arranged by chapter or combined, should be in alphabetical order by first author's last name and have the same format.

There is no length requirement, but a dissertation must capture the research the student has completed and provide sound evidence that the student is ready to proceed toward a career as an independent researcher. Typically the length of dissertations in this field is well in excess of 100 pages.

### D-9 Summary of PhD Requirements

MBS PhD students are required to complete the PhD core course requirements, which include taking Advanced Cell Biology, Specialized Biochemistry, and Molecular Genetics and Genomics. Each student will also take 1-3 credit hours of Ethics, Seminar each semester, and 18 credit hours of Dissertation. In addition, each student will normally take courses in their specialty area sufficient to bring the total number of credits to the minimum of 72 required for the PhD in Molecular Biosciences beyond the bachelor's degree or 42 beyond the master's degree. Any additional course work requirements will be determined by the PhD Advisory Committee to meet the student's specific program needs. For PhD MBS students, there are three public defenses: 1) dissertation proposal 2) a hypothesis-driven research proposal outside of the student's field of expertise (a Candidacy Examination) and 3) dissertation defense of their completed research. Each of these defenses is followed by an oral examination given by the PhD Advisory Committee. At its discretion the PhD Advisory Committee may also require a written examination. A PhD level research scientist must have the ability to form a research hypothesis based on previous knowledge in the area, design the critical experiments necessary to test the hypothesis, analyze the experimental data, propose additional experiments based on the data, and come to a successful resolution of the problem. Passing all required exams implies that the student has sufficient critical thinking skills to be able to solve any problems that might arise during the research. Thus, these examinations are important milestones for assessing whether the graduate student has the necessary knowledge and skills to advance toward completion of the Doctor of Philosophy Degree in Molecular Biosciences.

**Time to Degree.** The time allowed for completion of the doctoral degree is eight (8) years from first enrollment in the program, exclusive of time spent in the armed forces of the United States. Graduate work completed outside of the eight-year time frame cannot be used to satisfy degree requirements. Transfer credit taken prior to admission to A-State may be included in the eight-year, time-to-degree limit.

### E. MS THESIS DEGREE IN MOLECULAR BIOSCIENCES

The table below outlines the process which is discussed in more detail in the following paragraphs. Forms mentioned in this table are available on the MBS website <https://www.astate.edu/college/sciences-and-mathematics/doctoral-programs/molecular-biosciences/documents/> and from the MBS office.

MS Program in Molecular Biosciences		
TIMELINE	EVENT	ACTION
Before first semester	Select Advisor (assigned by the MBS Program Director if necessary)	Most MBS students will have entered the program having already chosen a Research Advisor.
By end of 2 <sup>nd</sup> semester	Choose a Research Advisor and assemble MS Advisory Committee	Submit <i>Request for the Selection of a MS Advisory (Thesis) Committee</i> form ( <b>Form 1</b> )
By end of 1 <sup>st</sup> year	1. <b>Program of study</b> approved by MS Advisory Committee  2. Set date for Qualifying Exam ( <b>Thesis Proposal Defense</b> )	1. Submit <i>Proposed Program of Study</i> form to MBS office ( <b>Form 2</b> )  2. Submit <i>Qualifying (Thesis Proposal Defense) Examination Intent</i> form to MBS office ( <b>Form 3</b> )



During 3 <sup>rd</sup> semester	1. Thesis research proposal to Committee  2. Qualifying Exam (Thesis Proposal Defense) public defense	The thesis proposal is focused on student's intended research. After successful defense, submit <i>Qualifying Examination (Thesis Proposal Defense) Results</i> form ( <b>Form 4</b> ) to MBS office
In last semester	Thesis to Committee; Schedule public defense of thesis	Submit <i>MS Thesis Defense &amp; Examination Intent</i> form ( <b>Form 5</b> ) to MBS office.
In last semester	Thesis seminar and defense	1. After successful defense, submit <i>Thesis Defense Result</i> form ( <b>Form 6</b> ) to MBS office,  2. Submit Intent to Graduate online form to Registrar's Office at the beginning of the semester in which you expect to graduate. This form is available at <a href="http://registrar.astate.edu/intent-instructions.pdf">http://registrar.astate.edu/intent-instructions.pdf</a>  3. Submit <i>Thesis Approval</i> form ( <b>Form 7</b> ) to the MBS office.  4. After <i>Thesis Approval</i> form has been signed by the Dean of the College of Science and Mathematics, submit thesis through graduation coordinator at the Registrar's office.

There are a series of projects and examinations designed to prepare and test the student's potential for success in the MS program. The student should talk to their advisor to ensure the proper steps are followed. In general there is a research proposal to be prepared and defended, course work to be completed, and ultimately defense of a thesis. The table above outlines the process which is discussed in more detail in the following paragraphs.

## F. MS THESIS COURSE REQUIREMENTS

Molecular Biosciences has a number of course requirements that are required:

### **Ethics and Responsible Conduct in Research**

(Select one of the following)

MBS 7151 Responsible Conduct in Research

BIO 5063 Biosafety and Ethics in Research

### **Seminar Courses** (Two semesters)

MBS 7111 Seminar in Molecular Biosciences

**Cell Biology**

MBS 6213 Advanced Cell Biology

**Biochemistry**

MBS 6233 Specialized Biochemistry

**Genetics and Genomics**

MBS 6243 Molecular Genetics and Genomics

**Techniques Courses** (Three semesters)

MBS 6251 Techniques in Molecular Biosciences

**Thesis** (6 hours)

MBS 689V Thesis

Substitution of equivalent courses may be made upon the recommendation of the MS Advisory Committee with the approval of the Director. In addition, each will normally take courses in their specialty area sufficient to bring the total number of credits to the minimum of 30 credits required for the MS in Molecular Biosciences beyond the bachelor's degree. Any additional course work requirements will be determined by the MS Advisory Committee to meet the student's specific program needs.

Additional Courses Offered:

MBS 6001 Fundamentals of Entrepreneurship for Scientists

MBS 712V Topics in Molecular Biosciences

MBS 713V Independent Study in Molecular Biosciences

MBS 7251 Mentored Teaching

It is strongly encouraged that students take **BIO 6003 Scientific Methods and Research Design**.

**G. MS THESIS KEY CONCEPTS****G-1 MS General Advisor**

General Advisor: Students who are not recruited to work with a specific advisor or who did not identify an advisor at the time of application will be assigned a "general advisor". This faculty mentor will be a member of the Program Committee and will be cognizant of all program policies and regulations. The "general advisor" will be assigned to the student before his or her arrival and will meet with the student prior to the start of the first semester in residence to provide information about program policies, expectations, and to develop a basic program of study plan that will be followed until the research advisor has been selected. Some of the responsibilities which can be assumed by the "general advisor" are:

1. Advising students on their course program and discussion of specialty area requirements.
2. Working with the student to identify a research advisor.
3. Serving as a point of contact for the student throughout their program of study.
4. Ensuring that the student is aware of program policies, procedures, and regulations.
5. Ensuring that the student gets a broad range of learning experiences.

6. Reviewing student performance as a teaching assistant as well as in courses.
7. Recommendations to the Graduate Program Committee regarding a student's progress.

### **G-2 MS Research Advisor**

Research Advisor: A student must select a permanent Research Advisor by the end of the first semester. Students who fail to choose a permanent research advisor before the second week of the second semester in the program jeopardize their academic standing in the program. If a research advisor is not selected by the end of a student's second semester, the student risks dismissal from the program.

The Research Advisor will often, but not always, be a member of the specialty area nearest to the student's research interests. The Research Advisor automatically becomes chair of the MS Advisory Committee and assumes primary responsibility for advising the student on coursework and other academic matters. Graduate students are encouraged to look up the research interests of MBS faculty members, seek appointments to discuss their research and identify an advisor. Further, during graduate student orientation, a series of sessions may be held at which faculty members may give a brief overview of their research programs. All new graduate students are encouraged to attend these sessions, as they are particularly useful in helping to identify faculty who should be interviewed at length about their research. The student and advisor should notify the MBS Program office (Program Office) as soon as a selection has been made.

Program policy limits the total period of time for which any one student can hold a Graduate Assistantship from the Program Office. Therefore, it is important and entirely appropriate for you to inquire about and consider carefully the ability of a given potential faculty advisor to support new students entering their research group. Feel free to ask faculty about details of how long the average student has spent earning the degree in that group in the past and how many semesters of support were provided by the program, a teaching assistantship from the host department and as a research assistantship funded by extramural grants. You should inquire about existing and pending research grants of the faculty member and about fellowships and scholarships available from external sources for which you are eligible to apply.

Changing a Research Advisor: Changing a Research Advisor after beginning a program of study can be done, but is often not in the student's best interest. If such a change is necessary, students must consult with the EVS Program Director before initiating the change. The student will then submit the *Petition to Change Research Advisor Form*. This form is available from the MBS Office.

### **G-3 MS Advisory Committee**

No later than the end of the second semester in residence, each student and his or her Research Advisor should assemble a MS Advisory Committee. The majority of faculty members making up the Advisory Committee must be from Arkansas State University. However, members may be external to the institution, but must have Graduate Faculty Status (to apply for Graduate Status, please contact the MBS Office). After consultation with the Research Advisor and with prospective Advisory Committee members, the Request for MS (Thesis) Committee Form (**Form 1**) is filed to request formation of a research committee. The MS Advisory Committee's responsibilities include, but are not limited to:

1. Advising students on their course program and discussion of specialty area requirements.
2. Determining the nature of the qualifying examination, establishing deadlines for that examination, and ensuring that deadlines are met.
3. Ensuring that each student receives an appropriate range of learning experiences.
4. Review of course work, examinations, and research.
5. Recommendations to the MBS Program Committee regarding a student's progress.

6. Recommending to the Director of the Graduate Program in MBS the inclusion or exclusion of previous graduate level coursework as part of the Program of Study.
7. Assist the Research Advisor in guiding the students MS research, evaluating the research, determining if the research is appropriate for earning the MS degree in Molecular Biosciences, recommending the student for the MS degree.

Changes in the MS Advisory Committee: To petition for a change in the membership of their MS Advisory Committee, the student MUST gain approval of the MBS Program Director. The student will then submit the Petition to Change MS Advisory Committee form. This form is available from the MBS Program Director and must be submitted with the reason for the request and must include the signatures of the advisor, the faculty member who is to be added to the committee, and, if possible, the member who is being replaced.

The MBS Program recommends a minimum of one formal meeting of the student, their Research Advisor and their MS Advisory Committee each semester. It is especially important for faculty to provide students with timely and candid advice when their performance is deficient or their lack of progress might prevent them from attaining the desired degree. This recommendation assumes that many other informal and frequent meetings between the Research Advisor and the student occur, often on a weekly or more frequent basis. In addition, students are strongly encouraged to also seek more frequent interaction with the members of their MS Advisory Committee.

The MBS Program recommends a minimum of one formal meeting of the student, their Research Advisor and their MS Advisory Committee each semester. Each spring semester, the student will be responsible in submitting a progress report to the MBS Office. Usually beginning in February, the MBS Director will send out two documents: the *MBS Student Annual Progress Report Form* and the *MBS Research Expectations Rubric*. The student will meet with their Research Advisor and get feedback from their Advisory Committee on how they are progressing in the program. A letter from the Research Advisory should also be attached to the progress report when submitted.

It is important for faculty to provide students with timely and candid advice when their performance is deficient or their lack of progress might prevent them from attaining the desired degree. This recommendation assumes that many other informal and frequent meetings between the Research Advisor and the student occur, often on a weekly or more frequent basis. In addition, students are strongly encouraged to also seek more frequent interaction with the members of their MS Advisory Committee.

#### **G-4 MS Program of Study**

The *MS Proposed Program of Study Form (Form 2)* lists the courses that will be taken during the student's course of study. These courses include required and elective courses that students are expected to successfully complete. The MS Advisory Committee is responsible for determining which courses are needed, thus, the Program of Study will be individually designed for each student. Students must file their *MS Proposed Program of Study Form* no later than the end of the first year of study. If changes in the Program of Study become necessary, they must be approved by the MS Advisory Committee and a revised version of the *MS Proposed Program of Study Form* submitted to the MBS Program office. This form is available on the MBS website and should be completed after the Program of Study has been approved by your Research Advisor and MS Advisory Committee.

#### **G-5 Thesis Proposal, Seminar and Defense**

By the end of the third semester in residence, a thesis proposal should be completed. This document must first be approved by the MS Research Advisor before the MS Advisory Committee review. The Thesis Proposal will describe the student's intended research and must describe the background and current status of the student's research problem.

Timing of Thesis Proposal Seminar and Defense: A final draft of the thesis proposal must be submitted to the MS Advisory Committee at least two weeks before the proposal seminar and defense. The Thesis Proposal cannot be signed off on unless the Advisory Committee has had the proposal for at least two weeks for review. Students must get approval from ALL members of the committee that the defense can take place as scheduled prior to the actual defense. Students should schedule a minimum of 3 hours for the defense (e.g., 1 hour presentation and 2 hours for the defense examination). Students must notify the MBS Program Office of the proposal defense a minimum of 2 weeks prior to the defense. The MBS *MS Qualifying (Thesis Proposal Defense) Examination Intent* form (**Form 3**) must be filed with the MBS Program Office. A Seminar Announcement to the MBS Program Office must also be submitted two weeks prior to the scheduled seminar.

Thesis Proposal Seminar and Defense Results: Each MS (Thesis) student must successfully present their MS Thesis Proposal to the public and the examination may include questions from the general audience. Possible outcomes of the proposal seminar are i) pass, or ii) fail. If a student fails the seminar portion, the MS Advisory Committee will suggest a course of action to rectify any perceived deficiency. Results of the proposal seminar must be filed with the MBS Program Office using the *MS Qualifying Examination (Thesis Proposal Defense) Report form* (**Form 4**).

After the seminar is presented and questions from the audience have been addressed, the MS Advisory Committee will continue the defense with a closed door proposal examination. In addition to specific questions about the proposal, the committee may explore other topics such as knowledge gained from coursework, seminars, and current literature or other matters of timely interest to molecular biosciences. Possible outcomes of the proposal defense are i) pass, or ii) fail. If a student fails the defense portion, the MS Advisory Committee will suggest a course of action to rectify any perceived deficiency. Results of the closed door questioning must be filed with the MBS Program Office using *MS Qualifying Examination (Thesis Proposal Defense) Report form* (**Form 4**). If the student passed the seminar and defense but needs to incorporate suggested revisions into the Thesis Proposal, **Form 4 SHOULD NOT** be submitted until the proposal is satisfactorily completed. The Thesis Proposal cannot be signed off on unless the MS Advisory Committee has had the proposal for at least two weeks for review. It should also be noted if the MS Advisory Committee recommends a retake of the closed door, proposal defense examination, Arkansas State University requires ten calendar weeks must pass before a retake of the examination can be scheduled.

*MS students who have not defended their proposal by the end of the fourth semester or who have not passed by the end of their fourth semester will no longer be in good standing in the MS Program.*

Students who must delay taking their initial or re-take of the qualifying or proposal defense examinations until after the specified time due to difficulties in passing their qualifying examinations or other extenuating circumstances, must submit a letter of explanation to the Director of the MBS Program. Such explanations must contain a new proposed qualifying and/or proposal defense deadline.

#### **G-6 MS Thesis Seminar and Defense**

By the end of the 4<sup>th</sup> semester, after completing an extensive research project approved by the Research Advisor and MS Advisory Committee, the student is required to present the written thesis to the MS Advisory Committee, and hold the final public defense. The format of this defense is identical to that of the Thesis Proposal Defense.

Timing of Thesis Seminar and Defense: A completed draft of the Thesis must be first approved by the Research Advisor before the Thesis is given to ALL committee members. The draft must be given to the Advisory Committee a minimum of 21 days before the defense date. Students must get approval from ALL committee members that the defense can take place as scheduled. Students should schedule a minimum of 3 hours for the defense (e.g., 1 hour presentation and 2 hours for the defense examination). Students must notify the MBS Program Office of the thesis defense a minimum of 2 weeks prior to the defense. The student must submit the *MBS MS Thesis Defense Intent form (Form 5)* to the MBS Program office. A seminar announcement to the MBS Program Office must also be submitted no less than two weeks prior to the defense.

Thesis Defense: Each MS student must successfully present their Thesis to the public and the examination may include questions from the general audience. After the seminar is presented and questions from the audience have been addressed, the Advisory Committee will continue the defense with a closed door defense of the thesis. The Advisory Committee will ask additional questions which can include topics such as coursework, seminars, current literature or other matters of timely interest to molecular science. Results of the closed door questioning must be filed with the MBS Program Office using the *MBS Thesis Defense Result Form (Form 6)*. If the student fails to successfully complete the thesis defense, the MS Advisory Committee can reclassify the student to the MS Practicum Program or they may recommend that the student be dismissed from the EVS Program Office. If the student passed both the seminar and defense but needs to incorporate suggested revisions into the research proposal, **Form 7 SHOULD NOT** be submitted until the Thesis is satisfactorily completed.

All members of the MS Advisory Committee must be in attendance for the defense. In the case of an emergency that prevents a member from attending, they may participate by conference call. If a member cannot attend or participate by conference call, the MBS Program Office must be notified at least two weeks in advance of the member's proxy. Questions provided by the absent member must be asked by the proxy, and answers recorded for review by the absent member. It is the student's responsibility to contact all members of the MS Advisory Committee regarding their willingness to attend the thesis defense.

### **G-7 Thesis**

Each semester the Registrar establishes a deadline for submission of completed theses. The thesis cannot be submitted to ProQuest before the *MBS MS Thesis Approval Form (Form 7)* has been signed by the MS Advisory Committee members, the MBS Program Director and the Dean of the College of Sciences and Mathematics.

The thesis must adhere to Arkansas State University's guidelines and must contain:

1) **Introduction.** This chapter should contain an extensive literature review that demonstrates the student's understanding of current research in their area and places their research into historical and scientific context. This chapter may also contain information about specific techniques used in the conduct of the research and is usually the longest chapter of a thesis. If material in the introduction was published as a review article of which the student was an author, this chapter should be preceded by an authorship/publication statement (see below). Student-authored review articles may not be copied verbatim.

2) **Research Chapters.** The introduction is followed by several (usually 2-3) chapters that describe specific research projects. All of these chapters should be organized as for submission to a relevant scientific journal and should contain an abstract, introduction, materials and methods, results and discussion sections. With the exception of the bibliography (references cited) published chapters may be copied as published if the student was the first author of the published article. Published articles which the student was not first author may not be so used. Review articles should not be included in this section, but material from published review articles is appropriate for inclusion in the Introduction. Each of these chapters must be preceded by:

a) Authorship/Publication Statement. This information should specify whether the article is published, "in press", "in review", has been submitted or is in preparation. All co-authors and their institutional affiliations must be included. If the article has not yet been submitted, this statement should include co-authors and the target journal. If any of the material in the chapter has been presented as a poster or talk at a scientific meeting, that information should also be included in this statement.

b) If the chapter has been published, it must also be preceded by a copyright statement. If the corresponding author (usually the Research Advisor) is not the copyright holder of the published article, permission to use the material must be obtained from the copyright holder. A statement showing that the student holds the copyright or that the corresponding author (acting on behalf of all the co-authors) holds the copyright or has received permission to use the material must be placed at the beginning of each chapter containing previously published material.

3) **Conclusion and Perspectives** (Future Directions). This chapter should summarize the research, describe the unifying theme of the research, and highlight the most important findings of the research and how they contribute to the field. Research results should also be discussed in the context of the published results of similar research. It should also contain a discussion of the importance and relevance of the research, prospective experiments or suggestions for future direction of the research.

4) **References Cited**. The final chapter of the thesis should contain the references cited in all chapters of the thesis. These may be arranged by chapter or combined, should be in alphabetical order by first author's last name and have the same format.

There is no length requirement, but a thesis must capture the research the student has completed and provide sound evidence that the student is ready to proceed toward a career as an independent researcher. Typically the length of theses is well in excess of 60 pages.

**G-8 Summary of MBS MS Requirements:** MBS MS students are required to complete a Thesis project and all MS core course requirements, which include MBS 6213 Advanced Cell Biology, MBS 6233 Specialized Biochemistry, MBS 6243 Molecular Genetics and Genomics, MBS 6251 Techniques in Molecular Biosciences (2 hours minimum), MBS 7111 Seminar in Molecular Biosciences (minimum of two semesters), MBS 7151 Responsible Conduct in Research, MBS 7251 Mentored Teaching. Each student will also take 6 credit hours of Thesis. In addition, each student will normally take courses in their specialty area sufficient to bring the total number of credits to the minimum of 30 to 36 required for the MS in Molecular Biosciences beyond the Bachelor of Science Degree. Any additional course work requirements will be determined by the MS Advisory Committee to meet the student's specific program needs. There are two public defenses: 1) thesis proposal and 2) thesis defense of their completed research. Each of these defenses is followed by an oral examination given by the MS Advisory Committee. A MS level research scientist must have the ability to form a research hypothesis based on previous knowledge in the area, design the critical experiments necessary to test the hypothesis, analyze the experimental data, propose additional experiments based on the data, and come to a successful completion of the research. Passing all exams implies that the student has sufficient critical thinking skills to be able to solve any problems that might arise during the research. Students must also acquire sufficient knowledge in the research area. Thus, these examinations are important milestones for assessing whether the graduate student has the necessary knowledge and skills to advance toward completion of the Masters of Science Degree (Thesis) in Molecular Biosciences.

## **H. ACADEMIC PERFORMANCE**

If a student is doubtful about his or her present academic status, the student should consult with the Research Advisor, MS Advisory Committee, or Director of the MBS Graduate Program.

Academic performance: If a student's record indicates insufficient progress toward degree completion, the student's performance may be considered unsatisfactory, is a cause for concern, and may jeopardize a student's standing as a graduate student in the Molecular Biosciences Program.

Review of the student's progress: Each spring the MBS Director reviews the progress of all MBS graduate students. Students who have not made sufficient progress during the past year will be reviewed by the MBS Program Committee, which may recommend strategies to ensure sufficient progress to the Research Advisor, MS Advisory Committee and student. In extreme cases or in those where insufficient progress is a pattern, the Program Committee may recommend dismissal from the MBS Program. Other than in exceptional circumstances, a decision to recommend dismissal of a student from the MBS Program is not made until the end of the first year.

Consequences of insufficient progress: Failure to meet any of the requirements listed below jeopardizes a student's standing in the program and may result in their dismissal from the MBS Program. The Research Advisor and MBS Program Director will assist students dismissed from the MBS Program in their effort to obtain a suitable/alternate MS. degree. However, because this involves transferring to another degree program, this may not always be possible.

1. **Any course grade below B.** A grade of C will result in the student being placed on academic probation. A second C or a grade of D results in the student's dismissal from the Graduate Program in Molecular Biosciences and may result in dismissal from the Graduate Status at the University.
2. **Failure to pass the qualifying examinations** by the end of the fourth semester in residence.
3. **A cumulative GPA below 3.00.** Note: Grade point average (GPA) refers to the GPA in content courses graded on a letter scale system and does not include grades in seminar course, independent study or thesis hours.
4. **Completion of fewer than 18 credits with a grade of B or better at the end of the first year in residence.** Insufficient progress toward a degree as manifested by too few course credits of B or better beyond the first year.
5. **Students who have not demonstrated English proficiency by the end of their first year of residency** as determined by the Advisory Committee and MBS Program Committee will not be eligible for further program support (although Research Assistantships may still be arranged with individual faculty members).
6. **Failure to pass the Qualifying Examination** (see Section I, G-5).
7. **Failure to successfully defend a dissertation or thesis.**
8. **Scientific misconduct.**
9. **Failure to comply with Federal, state and University policies and regulations** regarding safety, the use of animals, recombinant genomes, humans and radiation in research.
10. **Failure to complete assigned teaching duties.**

***The progress of all students who fail to meet one or more of the above requirements will be reviewed by the MBS Program Committee. After review, this committee may, at their discretion, recommend further action, including dismissal from the MBS Program to the MBS Program Director and the Dean of the College of Science and Mathematics.***

## **SECTION II. Getting Started and Knowing the Rules**

This section contains essential information for all students in the Graduate Program in Molecular Biosciences. Most MBS graduate students hold Graduate Assistantships in the form of externally-funded



Research Assistantships (RA) or University-supported Teaching or Graduate Assistantships (TA or GAs). All graduate students are responsible for knowing and complying with information in this manual that relates to their academic and service responsibilities.

## **A. MBS PROGRAM OFFICE**

The MBS Program office is located within the College of Sciences and Mathematics, suite LSW 538. From time to time it will be necessary to file various forms requiring the approval of the Director of the Graduate Program in Molecular Biosciences. All of this paperwork should be submitted directly to the MBS Program Office. Forms may be downloaded from the MBS website or obtained from the MBS Program Office.

## **B. REGISTRATION AND TUITION**

Graduate Assistants: If you are a Graduate Assistant, carefully review this section. If you have questions, contact the Registrar's Office (972-2031) or the Graduate Program in Molecular Biosciences (972-2007).

PhD Students: To hold an assistantship, the student must be registered for 9 hours each fall and spring semester he/she is in the program. If the student is supported during the summer sessions as a Graduate Assistant, he/she must register for a total of 6 credit hours. This can be broken down into 3 credit hours for each summer session.

MS Students: To hold an assistantship, the student must be registered for 6 hours each fall and spring semester he/she is in the program. If the student is supported during the summer sessions as a Graduate Assistant, he/she must register for a total of 3 credit hours.

Students who are supported in the summer through MBS Program funds need to register early for classes to ensure the student is paid in a timely fashion. If the student does not register in a semester, or if the student drops credit hours below the full time minimum, the assistantship will automatically be terminated retroactive to the beginning of the semester, the job classification will change to "non-student", the student will be billed for any tuition benefit received that term, and social security taxes will be withheld from wages. With questions about tuition benefits, or any billing problems associated with the above, please contact the Treasurer's Office: 870-972-2285.

Registration for classes is a web-based procedure. Course offerings should be reviewed before the student's first meeting with his or her Advisory Committee, so that the first semester program may be filled in and approved at the Advisory Committee meeting. Note that the student's registration will be delayed if the Registrar has not received a final transcript from the student's previous college or university that shows a degree has been received. The Registrar requires students to register no later than the 11<sup>th</sup> day of classes. This date is the last day to: 1) register, 2) add a course, 3) change a section, or 4) cancel a course without a "W" appearing on the transcript. Graduate students may cancel courses through the eighth week of the semester with the advisor's signature. Courses canceled after the eighth week require the signatures of both the advisor and the course instructor. No registration changes are permitted after the last day of class of the semester. Active status is required for students to be able to register for courses, take exams, submit progress forms, file for graduation, or otherwise participate in the University community as a Graduate Student. All Teaching Assistants are eligible for resident tuition rates regardless of source of funding.

Note: MBS faculty members or graduate students applying for funding from an external agency for which request of tuition is allowed are required to include this request in their grant proposal. Please see the Research & Technology Office staff for assistance with all grant proposal submissions.

### **Enrolling in Independent Study or Dissertation classes**

These classes have to be created before you can enroll so you and your advisor will need to work with the EVS office staff. For each course, the EVS Administrative Analyst will need the student and advisor to fill out the *MBS Course Creation Form* (one for each course created) that can be obtained from the MBS Program Office.

You cannot enroll in these courses without permission from your Research Advisor, so she/he needs to send the MBS Course Creation Form to the Administrative Analyst before you can enroll. Once the class has been created, you will receive an email from the Registrar's office with the codes and other information needed to enroll in the course. Once you receive that email, you should enroll immediately.

### **C. STUDENT CONDUCT**

You are responsible for abiding by the Student Conduct Code in the Student Handbook which can be accessed on-line at <http://www.astate.edu/a/student-affairs/student-conduct/OSC/standards-of-student-conduct.dot>.

### **D. E-MAIL ACCOUNTS**

Student email accounts can be set up by going to the ASTATE main webpage ([www.astate.edu](http://www.astate.edu)). Click on the "Current Students" heading, then on "Email" in the "Quick Links" list on the right hand side of the Current Students page. Follow the instructions on the StudentLogin page. You will regularly receive emails containing important information about deadlines, seminars etc. All of these emails will be sent to your [smail.astate.edu](mailto:smail.astate.edu) address, so be sure to check it frequently. Emails from the MBS program office will NOT be sent to email addresses that are outside the [astate](http://www.astate.edu) domain.

### **E. FEE STATEMENTS**

Only doctoral level Graduate Assistants supported by MBS Program funds are eligible for a tuition waiver. In general, fulltime enrollment for a doctoral and MS student is 9 hours and 6 hours per semester (including independent study and dissertation/thesis hours), respectively. All MBS students are expected to pay non-tuition fees. Student account balances are provided to the student online through the Banner system. Students are responsible for ensuring that their tuition and fees are paid in full in accordance with University deadlines.

### **F. OUTSIDE EMPLOYMENT**

Graduate Assistantships, whether Research or Teaching Assistantships, are payment for up to 20 hours of work per week. They are not, though, payment for the research that you should be doing as part of your dissertation or thesis. Therefore, GA's are strongly discouraged from accepting outside employment during the term of their appointment or award. This reflects the faculty's conviction that prompt completion of graduate degree requirements and duties required of a graduate or teaching assistant should be the only demand on a graduate student's time, and that any time outside of the time required for fulfilling the GA/TA duties should be spent working on your dissertation research. You must consult with your Research Advisor prior to committing to any outside employment, including work as a private tutor. As long as you are supported by grant or ASTATE funds (as a GA, RA or TA), you cannot accept any other employment within ASTATE. Outside employment without the prior approval of your Research Advisor and the MBS Program Director may jeopardize your position in the MBS program. International students have to follow the rules

and regulations imposed by USCIS (U.S. Citizenship and Immigration Services) and implemented by our international office.

### **G. SPACE**

Upon arrival, students will be assigned an office and study space designated by their research advisor. Also, the MBS Program Office must be notified whenever there is a change of the student's office phone number, local off-campus address, or off-campus phone number. This notification is necessary to ensure proper routing of communication and prompt updating of the program directory.

### **H. KEYS**

Upon arrival, students should ask their Research Advisor to help secure keys to their assigned office space from their host department or the ABI office staff. Copying or altering of keys is not permitted. Loss of a key requires the payment of a \$25.00 fine, and possibly, the cost of re-keying locks. All GA's sign a form signifying agreement of this policy when receiving keys ("I, the undersigned, by accepting the identified key, hereby agree to take diligent care and promptly report any loss thereof. I further agree not to give possession of said key to any other person, nor cause or allow any copies to be made of said key. I understand that any violation of this agreement may result in disciplinary action by the Administration of this institution.") Additional keys, e.g., for research offices, may be obtained as needed with the proper authorization through the student's host department.

### **I. MAIL BOXES**

Students may be assigned a mailbox in their host department to receive campus mail. There is a post office on campus where personal mail may be received. A map of the A-State campus can be found here: <http://www.astate.edu/dotAsset/448bb049-7d01-4c6e-82c3-50cf9ac4ed89.pdf>. Please inform your Research Advisor and the MBS Program Office once you have chosen a mail drop location so that we can ensure that your campus mail arrives in a timely manner.

### **J. SUPPORT AND TEACHING**

All Program support is arranged by the Director of the Graduate Program in Molecular Biosciences and the Program Committee, and is based in part on information provided by the student's Research Advisor.

PhD students: Incoming doctoral students typically receive 4 semesters of Program funded support. Support beyond 4 semesters is usually provided by research grants. However, if a student receives support through the MBS Program, the student will be required to teach in each of the semesters while on support. The maximum teaching load will be 1 laboratory or 1 lecture section per semester. Students who intend to teach a lecture section but have not had significant teaching experience in the past are required to take MBS 7251 – Mentored Teaching the semester prior to the lecture section being taught. The faculty member usually assigned to the course will become the Instructor of Record while the student teaches the course.

MS students: Funding for MS students can be obtained through Teaching Assistantships, or through research grants. Students and Research Advisors are encouraged to seek external funds to ensure continuity of student support throughout the length of graduate study.

### **K. PLAGIARISM**

Students who commit plagiarism are engaging in serious academic misconduct. They risk disciplinary action from the department in which the plagiarism occurred, the MBS Program, the College of Sciences and Mathematics and the Registrar, including the possibility of being dismissed from the MBS program.

ASTATE's policy on academic integrity is found here:

<http://www.astate.edu/a/student-conduct/student-standards/>

Remember that plagiarism is NOT simply the unattributed, verbatim quoting of published work. In fact, the definition is considerably broader. Rather, plagiarism is the act of presenting (a) someone else's ideas or data without acknowledgment or (b) turning in your own work that had been turned in or submitted earlier to fulfill a different requirement (self-plagiarism). It is not sufficient simply to paraphrase. This is not to say that you must never paraphrase. You may, as long as you do so with appropriate attribution. Direct quotes of more than two or three words should include quotation marks. Whenever you draw on someone else's ideas, you must attribute your source. The above guidelines apply to all work, whether it is published or not. If your research results, whether published or not, draw upon work described in a lab-mate's thesis, you must reference it. If it contains an idea that you heard expressed at a scientific meeting, you should seek that person's permission and then attribute it. The only exception is that you need not attribute facts that are so widespread as to be common knowledge. To give a trivial example, you need not attribute the periodic table should you cite the atomic mass of hydrogen. Graduate students enrolled in the Molecular Biosciences Program will be REQUIRED to complete Responsible Conduct in Research (MBS 7151). This course is offered every fall semester. With this background and the above guidelines, you should now have a clear idea of what constitutes good professional conduct in scientific writing. Additional guidance is available from the University Office of Research and Technology Transfer as well as in other sections of this handbook. If you have any doubts about whether your writing is acceptable, you should consult your advisor, the professor of a course if the work is for class assignment, or the Director of the Graduate Program in Molecular Biosciences.

### **SECTION III. Working Conditions and Responsibilities**

#### **A. PREAMBLE**

A major purpose of graduate education at Arkansas State University is to instill in each student an understanding of and capacity for scholarship, independent judgment, academic rigor, and intellectual honesty. Graduate education is an opportunity for the student to develop into a professional scholar. Graduate research and teaching assistantships offer an "apprenticeship" experience in the academic profession and financial support. It is the joint responsibility of faculty and graduate students to work together to achieve this purpose by establishing relationships that encourage freedom of inquiry, demonstrate personal and professional integrity, and foster mutual respect. As students are members of the larger academic community, this shared responsibility with faculty extends to all of the endeavors of graduate students. High quality graduate education depends on the professional and ethical conduct of all participants. Thus, faculty and graduate students have complementary responsibilities in the maintenance of academic standards and the creation of high quality graduate programs. Excellence in graduate education is achieved when both faculty and students are highly motivated, possess the academic and professional backgrounds necessary to perform at the highest level, and are sincere in their desire to see each other succeed. The following principles illustrate what students should expect from the MBS Program and what the program expects from our students.

#### **B. INFORMATION ABOUT POLICIES AND PROCEDURES**

The Graduate Program in Molecular Biosciences is responsible for providing access to information about graduate student financial support in the program, such as the prospects for fellowships, assistantships or other financial support. Students are responsible for keeping themselves informed about current policies of the MBS Program. Students and alumni also have a responsibility to respond to program inquiries about their career development.

#### **C. COMMUNICATION AND ACADEMIC STATUS**

The Graduate Program in Molecular Biosciences is responsible for providing students with information about their individual academic status. Students are responsible for communicating with the Registrar's Office and the MBS Program about changes in their circumstances that affect their status and progress toward the degree.

#### **D. RESEARCH CONTRIBUTIONS**

Research advisors and other individual faculty with whom students may work are responsible for providing students with appropriate recognition for their contributions at conferences, in professional publications, and in patent applications. Students and faculty should be familiar with the University Intellectual Property Policy found on-line at <http://www.astate.edu/a/ortt/intellectual-property-technology-transfer/>. It is the faculty member's responsibility to clarify the principles for determining authorship and recognition at the **beginning** of any project. Students are responsible for discussing their expectations regarding acknowledgment of research contributions or intellectual property rights with the appropriate person(s) in the research team, preferably early in the project. These topics are also discussed in the Responsible Conduct in Research course that all students are required to take during their first semester.

#### **E. ANIMAL, HUMAN SUBJECTS, USE OF INVASIVE/REGULATED SPECIES, RADIATION, AND BIOHAZARDOUS MATERIALS, AND LASERS**

Numerous federal and state regulations must be followed if using animals, humans, radiation, lasers, or biohazardous materials, including recombinant DNA, in research or teaching. The Institutional Animal Care and Use Committee (IACUC), Institutional Review Board (IRB), Radiation Safety, and Institutional Biosafety Committee (IBC) have responsibility of approving research protocols involving animals, human subjects, radioactive isotopes, and biohazardous materials respectively. Protocols detailing the use of these subjects or materials must be approved by the appropriate committee **before** the research can begin.

The University currently does not require submission of a protocol prior to using high-powered lasers. Nevertheless, laser users must participate in Laser Safety Institute training prior to project onset. Laser use is also subject to the review of the campus-designated Laser Safety Officer. For additional information, please review the Governing Principles for each of the foregoing subject areas at <http://www.astate.edu/a/ortt/research-compliance/>

#### **F. UNIVERSITY GOVERNANCE**

The Graduate Program in Molecular Biosciences and participating departments and colleges are responsible for defining specific opportunities for student participation on committees as they deem appropriate. The University recognizes that graduate students make important contributions to governance and decision making at the MBS Program, Department, College, Graduate Council and University level; specific roles for participation are defined at each level by the relevant governing bodies. Students are eligible for and encouraged to participate in University governance and decision-making that enriches the campus community through service on committees etc. For example, the MBS Program Committee that is responsible for overseeing this program has two student representatives who are selected by their peers.

#### **G. PROGRAM GOVERNANCE**

The Graduate Program in Molecular Biosciences is housed in the College of Sciences and Mathematics. The Dean of that College, Graduate Council, the Registrar and Academic Affairs are ultimately responsible for the administration of the MBS Program. Thus, the signatures of the dean, as well as the Registrar are required on many important forms. The Director of the MBS Program is appointed by the Dean of the College of Sciences and Mathematics and is responsible for the day-to-day operation of the program, for ensuring compliance with all relevant University and College policies and for assisting students and faculty in the program. The MBS Program committee, upon approval by the Dean, is responsible for establishing Program policies and guidelines. Under the direction of the Dean of the College of Sciences and Mathematics and the Graduate Council, this committee works with the Program Director and is responsible for admission of students, review of student progress, developing policies, setting graduation requirements and general oversight of the program. The MBS Program Committee consists of the MBS Program Director, Faculty representatives appointed by the Dean of the College of Agriculture and Technology, the Chairs of the Departments of Biological Sciences and Chemistry and Physics, two at large faculty members selected by the faculty active in the MBS program and two students selected by students enrolled in the MBS Program.

## H. RESPECTFUL WORKING CONDITIONS

University faculty and staff are responsible for assuring that graduate students are able to conduct their work in a manner consistent with professional conduct and integrity, free of intimidation or coercion. Students have the protection of University policies. The Program is responsible for providing clear communication to students about the possibility for appeal to a third party for assistance in resolving disputed issues. Students are responsible for reporting unprofessional conduct to the appropriate body or person, as defined in the University Grievance Policy; they should be able to do so without fear of reprisal. Students are responsible for acting in a respectful and fair manner toward other students, faculty, or staff in the conduct of their research, academic work or work they may do in connection with an assistantship.

## I. CONDITIONS OF EMPLOYMENT

The University (through its Programs, Departments and Colleges, research projects or other employing units) is responsible for providing to prospective graduate assistants a written offer of financial support before a response to the offer is required. Such communication must indicate the stipend, and the terms and conditions of the appointment, including the general nature of the work they will be performing, duration of employment, and whether and how this employment is tied to their academic progress. The details of specific teaching or research assignments may need to await later written clarification. Also at times the students may accept Graduate Assistantships. All graduate students and their advisors need to fill out and sign the Graduate Assistant Duties and Responsibilities form at the beginning of each semester or for the entire year at the beginning of the fall semester. This form is available at the office of MBS Program. Students are responsible for accepting the conditions of appointment only if they believe they are qualified and able to complete the tasks assigned. Students have a responsibility for communicating in writing any changes in their circumstances that affect their ability to fulfill the terms and conditions of their appointment. Typically this information is contained in a letter of acceptance sent to each student when they are accepted into the program.

Although students are expected to complete the bulk of their research on the ASTATE campus, short term visits to other institutions, laboratories and facilities are encouraged as necessary to supplement research activities. For example, work in a laboratory at another University that can provide access to equipment, methods or expertise that is not available at ASTATE is encouraged as it enhances the student's skill set, their intellectual and scientific development and often strengthens their research. However, being off campus for extended periods of time is discouraged. If it becomes necessary for any student to work away from campus for periods of more than a few weeks, the student must submit a written request to the MBS Program Director. The request must include a written recommendation from the Research Advisor. After consideration of the request the MBS Program Director, such requests must be approved by the Dean of the College of Sciences and Mathematics and the Registrar.

## J. SAFE WORKING ENVIRONMENT

Supervisors are responsible for providing a safe working environment for graduate students, and for ensuring that students have received University approved safety training. As the need arises supervisors are also responsible for developing and publicizing safety policies and training programs to ensure a safe working environment. Graduate students are responsible for completing University-mandated safety training, helping to maintain a safe working environment, adhering to safety policies, participating in training programs and for reporting safety violations to the proper authority. University documents that provide additional information and guidance relevant to the graduate education experience include the following:

Graduate Student Bulletin:

<http://www.astate.edu/college/graduate-school/files/12-13%20G%20Bulletin%20copy.pdf>

Student Handbook: <http://www.astate.edu/dotAsset/edf8e0cc-ff88-467c-8d2a-4cfa98aa5b02.pdf>

"Governing Principles for Safe Laboratory Practice" and a complete list of compliance practices can be found at : <http://www.astate.edu/a/ortt/research-compliance/>

Intellectual Property Policy: <http://www.AStatesystem.edu/dotAsset/4b510119-82be-4c88-ab98-938f8dcecdabb.pdf>

Faculty Handbook: <http://www.astate.edu/dotAsset/8b420f7f-2d0e-4f47-a36a-214372edd33f.pdf>

Safety training is required of all students BEFORE they can begin work in any laboratory on campus. Students are expected to work with their Research Advisor to complete this training. Safety training modules are available on Blackboard Learn (<https://bblearn.astate.edu/>).

## K. GRIEVANCES

All students enrolled at Arkansas State University are provided free electronic access to the ASTATE *Student Handbook and Planner* at the beginning of each academic year at the following web address: <http://www.astate.edu/a/student-conduct/student-standards/>. This handbook provides complete details of all policies and procedures in effect at ASTATE. The academic grievance policy and all details necessary for filing a formal grievance are found in this handbook and should be followed. Please review that information and be familiar with the procedural mechanism associated with filing a grievance. Additional information pertaining to sexual harassment and the grievance procedures for resolving such disputes are also in this handbook. ASTATE does not tolerate sexual harassment by teachers or students in any of its forms. ASTATE provides training to recognize and report about sexual harassment and all students should complete this training. For additional information, go to <http://www.astate.edu/a/affirmative-action/sexual-misconduct/misconduct-grievance.dot>

If a conflict should arise between a graduate student and another member of the Graduate Program regarding a course, a teaching assignment, or a matter of research supervision, the student should make every effort to resolve this with the party or parties involved. If the problem remains unsolved at this level and it does not directly involve the Research Advisor, the student should consider the Research Advisor the first point of contact in resolving a grievance. If the issue is not .resolvable by the student and Research Advisor or directly involves the Research Advisor, the student may request a meeting with the Program Director. In particular, grievances should be brought to the Director of the MBS Graduate Program, the Chair of the faculty members department, the Dean of the College of Sciences and Mathematics, or the Graduate Council as appropriate to the problem. Issues irresolvable at the Program or College level will be brought to the Registrar's Office.

## SECTION IV. Graduate Assistantships and Teaching Appointments

All students receiving an assistantship from the MBS Program will be required to teach.

### A. TEACHING APPOINTMENTS

Appointments of graduate assistants with classroom or laboratory teaching duties use the official title "Teaching Assistant". **All graduate students admitted to the MBS program at or after fall of 2010 are required to have completed a minimum of two assignments of teaching assistantships.** Completing at least one teaching assistant assignment is strongly recommended for students who were admitted earlier than fall of 2010. For those who were admitted earlier no restrictions on the type of assignment should be inferred from the title. The graduate student may be assigned to grading, developing written solutions to problem sets, instructing laboratory or lecture sections, developing new laboratory or field activities, other educational duties, or a combination of any or all of these. TAs for whom English is a second language may be required to take a spoken English examination upon arrival to campus. Students who cannot



demonstrate proficiency in this area may be re-assigned to other duties until such proficiency is demonstrated. Students who show no proficiency with spoken English after one year of residency in the program may be required to take English language courses (e.g. Speech Communication or English as a Second Language) with additional costs being the responsibility of the student.

## **B. TEACHING ASSISTANT ASSIGNMENTS**

Teaching Assistant (TA) assignments are made by the Director of the Graduate Program in Molecular Biosciences in collaboration with the student's Research Advisor and Chair of the Department in which the student will be teaching. If you have a strong preference for the type of teaching assignment you are given, it should be made known to the host Department Chair, your Research Advisor, and the MBS Program Director. TAs are under the direction of the Department in which they are teaching and are expected to comply with all requirements of that Department. They are expected to be present at every required class or laboratory and to give their class schedule to the Chair of that Department in a timely manner so that teaching schedules can be developed. Typically this must be done at least 1 week before classes begin. In case of foreseeable, unavoidable absences, the TA must notify the faculty member in charge of the course as early as possible, and arrange for a substitute. In case of illness or other emergencies, notify the host Department office and/or the faculty member responsible for the course as early as possible so that a substitute can be found. When a substitute is arranged, it is assumed that the graduate student will repay the substitute by taking some of the substitute's hours at a later date. Absences from assigned duties without an arrangement for having the duties covered by another TA are very serious infractions and may result in termination of the appointment. Any and all questions which arise concerning a TA's teaching duties in a course should be referred to the faculty member in charge of that course and will ultimately be decided by the Chair of the Department in which the course is taught. It is the TA's responsibility to obtain information on the proper operation and grading of the course to which he or she is assigned. All TAs will have their teaching duties evaluated each semester by the course instructor and the students. The MBS Program Director, Department Chair and MBS Program Committee will receive the results of that evaluation and may conduct their own evaluations as needed. Consistently poor ratings or student complaints will be taken into consideration before reappointments are made.

## **C. TERM OF SERVICE**

Appointment as a TA is typically offered on a semester basis, August 15-December 31, and January 1-May 15. TAs should expect to devote an average of 10 hours per week to a TA assignment during each semester. This time requirement will probably vary from week to week.

## **D. RESOLVING STUDENT/TEACHER ISSUES**

In the event that a TA has an issue with a student they should immediately contact their teaching supervisor and/or the instructor of record for the course, as well as their Research Advisor at the same time. Under NO CIRCUMSTANCES should the TA attempt to resolve the issue without consulting these responsible parties. If the problem cannot be solved by the supervisor or instructor of record, the TA should contact, in collaboration with the Research Advisor, the host Department Chair. Only after the problem has been brought to the chair of the teaching host Department and the issue remains unresolved should the TA bring the issue to the MBS Director. If the problem remains unresolved, the Director will work with the Department Chair to present the issue to the College Dean and the Program Committee for further action. If the issue cannot be solved at the Program or College level, the issue will be brought to the Graduate Council. Similarly, teaching supervisors who encounter issues with TAs should first consult the student, followed by the Research Advisor. If the problem remains unresolved, the Research Advisor or teaching supervisor should contact the teaching host Department Chair and the MBS Director. If the issue cannot be solved at the Program or Department level the issue will be brought to the Dean of the College of Sciences and Mathematics and the Provost.

## **E. TEACHING ASSISTANTSHIP MENTORSHIP**

The Faculty member Instructor of Record for the course in which the TA is assisting agrees to provide significant mentorship to MBS TAs. It is in the interest of MBS students and the Instructors of Record that



they assist to receive regular mentorship to improve their teaching. Host Departments may provide additional training to students serving courses in these Departments. TAs can request additional training through the Program Office and host departments.

## **F. RESEARCH ASSISTANTSHIPS**

Appointments as Research Assistants (RA) are made from funds granted by government agencies, non-profit foundations, or industry with specific research projects proposed by members of the faculty. Such appointments are normally arranged between the Research Advisor and the student. The continuity of a Research Assistantship is subject to the continued availability of funds. The MBS Program will, however, work with students and Research Advisors to identify sources of alternative support in case of an unexpected termination/interruption of a research grant or program. To ensure reappointment in subsequent periods as an RA, it is expected that Research Assistants will remain on duty during periods of employment. It is recommended that Research Advisors who are providing grant support to students sign a formal contract indicating the responsibilities of the student and advisor, clarifying responsibilities of both parties and ensuring communication of expectations. Contact the Office of Research and Technology Transfer for assistance in crafting the appropriate document, and file a copy of this document with the MBS Program Office. Students who are transitioning from grant support and intend to request MBS support should contact the MBS office immediately to ensure consideration by the MBS Program Committee.

## **G. GRADUATE ASSISTANT HEALTH CARE PLAN**

International students are required to have hospitalization insurance. International students should contact the International Programs Office regarding these arrangements (see the International Student section of this Handbook). At this time, University supported graduate students are not eligible for participation in the University Health Care Plan. Graduate Assistants are encouraged to purchase a private insurance plan. Research Assistants supported through external funds may be provided insurance coverage at the discretion of the funding agency and Research Advisor.

## **H. BENEFITS, LEAVE, TRAVLE and VACATION**

**Workman's Compensation:** Graduate Assistants are covered by Workers' Compensation but do not qualify for unemployment compensation. Graduate students injured in the laboratory or in the field should immediately notify their Research Advisor and as soon as practical, complete an injury report form. The applicable form is available at [http://www.astate.edu/a/ehs/occupational-safety/files/form\\_p.pdf](http://www.astate.edu/a/ehs/occupational-safety/files/form_p.pdf) or in the ABI or Departmental Office.

**Parental leave:** A man or woman may take up to six weeks leave without pay related to the birth or adoption of his/her child. If Graduate Students wish to take leave they must make the proper arrangements with their Research Advisor, host Department, MBS Program Office, and Academic Affairs to ensure continuity of Graduate Assistantship upon return.

**Emergency Leave:** Should students encounter issues which preclude their ability to fulfill the obligations of their teaching, research assignment, or course work, students must inform the Graduate Program office that they wish to take Emergency Leave. Emergency Leave will effectively place the student on "hold" and will ensure that the semester(s) in which the student is on Emergency Leave do not count towards the number of enrolled semesters used towards timely completion of their degree. Students may receive an incomplete for courses or may withdraw and should discuss options with their instructors prior to taking Emergency Leave. The Program Office will handle the paperwork associated with taking Emergency Leave. The student must leave current contact information with the office and periodically check in to inform Program Office personnel of the status of possible return or continuation of leave.

**Travel:** Travel Accident Insurance is provided to Graduate Assistants on Arkansas State University business. Complete information about ASTATE's travel policies is available at the Office of Procurement and Travel Services website (<http://www.astate.edu/a/procurement/travel-services/index.dot> ). It is in your best interests to review these policies before traveling—especially if you expect to be reimbursed for expenses. You should consult your Research Advisor for more guidance about travel but briefly, a Travel

Authorization (TA) Form must be submitted to the MBS Program Office at least 14 days in advance of travel to ensure coverage. This form is available at: <http://wt-dc19-prod.astate.edu/dotAsset/db0cd4b2-df9a-4f84-a4bb-34ec8311ea32.pdf> . After completion of travel, reimbursement of expenses requires submission of a TR-1 form and applicable receipts (<http://wt-dc19-prod.astate.edu/dotAsset/261066.pdf>). Students doing field work should consult with their Research Advisor to make sure they are aware of the policies and procedures associated with field work. Please be aware that failure to comply with travel policies and guidelines may jeopardize your ability to get reimbursed for legitimate expenses incurred while traveling. Because ASTATE is a state institution, travel policies are determined by the State of Arkansas so exceptions cannot be granted. Students are advised that it is in their best interests to be certain they understand policies regarding reimbursements before expenses are incurred.

**Vacation:** Although Graduate Assistants and most faculty members are afforded no “formal” vacation leave, this does not imply that they cannot take vacation time. Students should consult with their Research Advisors regarding the time they wish to take for vacation.

## **SECTION V. Good Practices in the Graduate Student-Faculty Advisor Relationship**

This discussion includes practical advice for:

Faculty Advisors

Graduate Students

MBS Program and Host Departments

High-quality graduate education depends upon the professional and ethical conduct of the participants. Although the University is composed of many distinct disciplinary “cultures,” its faculty and students together form a community of scholars. As such, they have complementary responsibilities for upholding academic standards and sustaining a creative and collegial environment. The following guidelines are focused on the professional academic relationship between faculty and graduate students, and are based on the collective experience and wisdom of a number of major research universities. Their purpose is to encourage a heightened awareness of, and conscious commitment to, practices routinely followed by the great majority of faculty and students here and elsewhere as a matter of common sense, courtesy, and basic honesty. Although a few of these guidelines have more direct relevance to some fields than to others, most are applicable across the entire disciplinary spectrum.

### **A. FACULTY ADVISOR’S ROLE**

- Serve as intellectual and professional mentors to their graduate students, by:
  1. Helping students develop laboratory, field, writing, oral, quantitative, or other relevant professional skills required by the discipline;
  2. Helping more advanced students design research programs that take advantage of their individual interests and strengths and that can be completed in a timely manner;
  3. Encouraging, by example and precept, a dedication to high-quality teaching;
  4. Encouraging faculty-graduate student collaborations which entail the sharing of authorship or rights to intellectual property developed in research or other creative activity;

5. Encouraging students to be open about any problems in their working relationships (including the relationship with the advisor), and being open to making accommodations to deal with such problems;
  6. Providing students with evaluation of their progress and performance in regular and informative ways.
  7. Guiding the student to prioritize their duties in a manner that ensures continuous progress and timely accomplishment of the research project aims during the program.
  8. Supervising student progress and providing candid advice when their performance or lack of progress might prevent them from attaining their degree in a timely manner.
  9. Communicating all specific policies for that laboratory and the consequences if those policies are not followed. These policies include but are not limited to: numbers of hours students are expected to work each day/week, laboratory meeting schedule, attendance at other meetings, vacation frequency and length, data keeping and back up policies, periodic reports, etc.
- Be knowledgeable concerning the academic and non-academic policies that pertain to graduate students, including:
    1. Helping students understand the requirements and timetable that each must meet, including coursework, research tools, specific research responsibilities, examinations, and thesis or dissertation,
    2. Discussing laboratory, Departmental, Program, or University authorship policy with graduate students in advance of entering into collaborative projects;
    3. Drawing student's attention to University policies on Intellectual Property, Environmental Health and Safety, Scientific Misconduct, the Honor Code, and requiring that they be followed.
  - Prepare students to be competitive for employment, by:
    1. Promoting free inquiry and the free exchange of information, subject to the University's policies regarding secrecy and confidentiality of research;
    2. Acknowledging student contributions to research presented at conferences, in professional publications, or in applications for copyrights and patents;
    3. Encouraging graduate students to participate in professional meetings, perform or display their work in public settings, and publish the results of their research;
    4. Providing a realistic view of the field and the current job market and making use of professional contacts for the benefit of their students.
  - Maintain a high level of professionalism, including:
    1. Excusing themselves from participating in committee decisions regarding any student with whom they have a relationship that could result in a conflict of interest;
    2. Never impeding a graduate student's progress toward the degree or toward employment in order to benefit from the student's proficiency as a Teaching or Research Assistant;
    3. Interacting with students, staff, and faculty colleagues in a professional and civil manner, and in accordance with University policies.

## B. GRADUATE STUDENT'S ROLE

Understand the Research Advisor's central role, as well as their constraints. This includes:

1. Recognizing that the Research Advisor provides the intellectual and instructional environment in which the student conducts research, and, through access to teaching and research funds, may also provide the student with financial support;
  2. Recognizing that the Research Advisor is responsible for monitoring the accuracy, validity, and integrity of the student's research, and for ensuring that the contributions of all participants in the research are properly acknowledged in any publications. For these reasons and because the quality of that research reflects not only on the student, but also on the faculty and the University, students must work closely with their Advisor in the preparation of any form of presentation or publication of work carried out under the Advisor's direction and in the Advisor's Laboratory. The Research Advisor is the senior author of the work, and the corresponding author who, on behalf of all co-authors, submits all scientific correspondence with the publishing entities.
  3. Being aware of time constraints and other demands imposed on faculty members and program staff;
  4. Understanding that each Research Advisor has to regularly submit reports to the University, State and funding agencies that include a summary of each of their student's progress and achievements during reporting period;
  5. Taking the initiative to arrange meetings with the Research Advisor as often as necessary and to keep the Advisor informed of any factors that might affect the progress of their research or time to degree.
- Recognize the importance of seeking an early and informal resolution of any problems in their working relationships with their Research Advisor or others by first consulting with the Research Advisor.
  - Take primary responsibility for informing themselves of the regulations, policies, and practices governing their financial aid, degree and course requirements, research activities, travel, and conflict resolution. This may involve:
    1. Consulting departmental notes or guidelines for Graduate Students, the Molecular Biosciences Graduate Student Handbook, the research policies set forth by the Office of Research and Technology Transfer, and the Graduate Student Bulletin;
    2. Seeking clarification from the Research Advisor when they are uncertain about the precise meaning or application of a regulation or policy statement.
  - Exercise high professional standards in all aspects of their work. This includes:
    1. Observing the University's policy on scientific misconduct. This policy applies to researchers in all disciplines and to students as well as faculty and staff;
    2. Maintaining absolute integrity in taking examinations and in collecting, analyzing and presenting research data;
    3. Taking special care to preserve the data collected during experiments or noted during research (with precise identification of sources) in order to avoid future confusion or disputes about access or ownership. Unless specified otherwise by your Research Advisor, all records of experiments should be kept in an enumerated lab notebook and written in permanent ink;

4. Acknowledging the contributions of the Research Advisor and other members of the research team to the student's work in all publications and conference presentations. It is also appropriate to acknowledge the sources of financial support. Students should familiarize themselves with the statement on Academic Authorship information provided in the MBS Graduate Handbook.
- Maintain the confidentiality of the Research Advisor's professional activities and research prior to presentation or publication, in accordance with existing practices and policies of the discipline.
  - Inform faculty of conflicts and work towards a clear resolution.
  - Interact with faculty, staff and other students in a mature, professional, and civil manner in accordance with University policies.
  - Develop grant writing skills by assisting their mentor in proposal preparation, applying for graduate research fellowships, travel awards and similar student oriented grants awarded by professional societies and federal and state agencies.

### **C. THE MBS PROGRAM'S ROLE**

- Introduce new graduate students to the policies, practices, and resources of the MBS Program by means of an orientation session;
- Provide students with written documentation of MBS Program policies, designating one or more members of the faculty as resources for graduate students and faculty to call on to help resolve conflicts. This role may be filled by the MBS Program Director, the Graduate Council, or a designated program ombudsperson. Problems are usually resolved most quickly and effectively at the program level, but in exceptional circumstances a student may wish to consult the Graduate Council.
- For International students, the Office of International Programs provides orientation that includes guidance about filing state and federal taxes, immigration policies, etc. All international students should take advantage of this source of reliable information about these sometimes confusing subjects.
- Assist students in enrolling in Independent Study and Dissertation courses that require creation of new course codes and advisor approval.
- Provide orientation to International students to supplement information about student responsibilities that are not provided by the office of International Programs. This includes information about annual US and state taxes, vacations, and working hours.

## **SECTION VI. Intellectual Property and Scientific Integrity**

These issues are covered in detail in the Responsible Conduct in Research course that is required of all incoming MBS students. The following is a brief discussion that seeks only to highlight critical issues.

## **A. ACADEMIC AUTHORSHIP**

University faculty seeks to foster the intellectual growth and independence of students through authorship credit and adherence to standards for citation and acknowledgment. However, issues related to academic authorship, i.e., the allocation of responsibility and credit for scholarly publications, can be complex. Where multiple authors contribute to a paper, the guidelines below should be followed:

- 1) Principal Investigators and senior faculty have special responsibilities to assure the overall cohesiveness and validity of the publications on which they appear as co-authors.
- 2) All authors in a group effort have a shared responsibility for the published result and should have the opportunity to review all sample preparation procedures and data, as well as all data acquisition and analysis procedures.
- 3) Each author in a group effort should have access to the manuscript prior to its being submitted for publication, and should agree to his or her inclusion as a co-author.
- 4) Early in any research project, each research group should define appropriate practices for the maintenance of data and, as much as possible, authorship responsibilities.

The following discussion of Academic Authorship is extracted from a statement by Donald Kennedy, then President of Stanford University, that was circulated to faculty in September 1985: "The understanding in my laboratory was this: If I had contributed to the idea of the project and had also contributed significantly to the hands-on work, co-authorship was justified; but any coauthor had to have a complete enough grasp of the whole effort to defend it effectively in a scientific meeting". This test, of course, is tailored to an experimental science and surely is not the only one applicable. Whatever the agreement, it is necessary also that there be a prior understanding of the scope of the particular project or sub-project; that is, all prospective authors should know the anticipated product to which the agreement applies.

Another aspect of the same cluster of issues (i.e., who may publish first, who must consent, what connections with the work need to be acknowledged and how) is associated particularly with review articles, books (or chapters of books), or symposium contributions, especially "State of the Discipline" pieces. Where the piece deals with data or results of others that are already published as a paper or dissertation, or which have been accepted for publication, then employing them with appropriate citation is obviously proper. You may want to read the guidelines for research communication from Society for Neuroscience at <http://www.sfn.org/skins/main/pdf/Guidelines/ResponsibleConduct.pdf>

## **B. RETENTION OF/ ACCESS TO RESEARCH DATA**

Accurate and appropriate research records are an essential component of any research project. Both the University and the Principal Investigator (PI, graduate student's primary advisor) have responsibilities and rights concerning access to, use of, and maintenance of original research data. Except where precluded by the specific terms of sponsorship or other agreements, tangible research property, including the scientific data and other records of research conducted under the auspices of Arkansas State University, belongs to the University. The PI is responsible for the maintenance and retention of research data in accord with this policy. Questions on the interpretation of this policy may be directed to the Vice Chancellor of Research and Academic Affairs.

### Definitions and Applicability:

This policy shall apply to all University faculty, staff, students and any other persons at the University involved in the design, conduct or reporting of research at or under the auspices of Arkansas State University, and it shall apply to all research projects on which those individuals work, regardless of the source of funding for the project. Research data include laboratory notebooks and field notes, as well as any other records that are necessary for the reconstruction and evaluation of reported results of research and the events and processes leading to those results, regardless of the form or the media on which they may be recorded. The University must retain research data in sufficient detail and for an adequate period of time to enable appropriate responses to questions about accuracy, authenticity, primacy and compliance with laws and regulations governing the conduct of the research. It is the responsibility of the Principal

Investigator to determine what needs to be retained under this policy. Where research is funded by a contract with the University that includes specific provision(s) regarding ownership, retention of and access to technical data, the provision(s) of that agreement will supersede this policy.

Ownership:

The University's ownership and stewardship of the scientific record for projects conducted at the University, under the auspices of the University, or with University resources are based on both regulation (OMB Circular A-110, Sec. 53) and sound management principles. Arkansas State University's responsibilities in this regard include, but are not limited to:

- Complying with the terms of sponsored project agreements.
- Ensuring the appropriate use of animals, human subjects, biohazardous materials (including recombinant DNA), etiological agents, radioactive materials, lasers and the like.
- Protecting the rights of students, postdoctoral scholars, and staff, including, but not limited to, their rights to access to data from research in which they participated.
- Securing intellectual property rights.
- Facilitating the investigation of charges, such as scientific misconduct or conflict of interest.

The University's Intellectual Property Policy can be found here:

<http://www.AStatesystem.edu/dotAsset/4b510119-82be-4c88-ab98-938f8dcecdbb.pdf>

Collection and Retention of Research Data:

The Principal Investigator (PI) is responsible for the collection, management and retention of research data. Although a graduate student may work on the project, the ultimate responsibility for the research is that of the PI. PIs should adopt an orderly system of data organization and should communicate and enforce the chosen system to all members of their research group and, if applicable, to the appropriate administrative personnel. Particularly for long-term research projects, PIs should establish and maintain procedures for the protection of essential records in the event of a natural disaster or other emergency. Research data must be archived for a minimum of three years after the final project close-out, with original data retained wherever possible. In addition, any of the following circumstances may justify longer periods of retention:

- Data must be kept for as long as may be necessary to protect any intellectual property resulting from the work.
- If any charges regarding the research arise, such as allegations of scientific misconduct or conflict of interest, data must be retained until such charges are fully resolved.
- If a student is involved, data must be retained at least until the degree is awarded or it is clear that the student has abandoned the work.
- If the funding agency requires that the data must be retained for more than three years, then the data needs to be retained to fulfill their requirements. Beyond the period of retention specified here, the destruction of the research record is at the discretion of the PI and his or her Department or laboratory.

Records will normally be retained in the unit where they are produced. Research records must be retained on the University campus, or in facilities under the auspices of the University, unless specific permission to do otherwise is granted by the Associate Vice Chancellor for Research and Technology.

Access:

Where necessary to assure needed and appropriate access, the University has the option to take custody of the data. When individuals involved in research projects at Arkansas State University leave the University, they may take copies of research data for projects on which they have worked. Original data, including student and faculty research notebooks, computer files or any other materials relevant to the project however, must be retained at the University by the Principal Investigator. If a Principal Investigator leaves Arkansas State University, and a project is to be moved to another institution, ownership of the data may be transferred with the approval of the Associate Vice Chancellor for Research and Technology Transfer, and with written agreement from the PI's new institution that guarantees: 1) its acceptance of custodial responsibilities for the data, and 2) Arkansas State University access to the data, should that become necessary.

### **C. RELATIONSHIPS BETWEEN STUDENTS AND OUTSIDE ENTITIES**

As part of their University education, graduate students, may establish relationships with outside entities, such as private companies or non-profit organizations (including government agencies, foundations, public action organizations, school systems, etc.). These relationships may range from student internships that are part of a formal Program of Study in Molecular Biosciences to the actual conduct of a student's research at the outside entity. In addition to these activities, which are part of the student's academic program, students may have the opportunity to serve as consultants to outside entities. All of these relationships may have considerable educational value for the student, providing unique educational or research resources and familiarizing students with the work environment of private companies or non-profit organizations. However, the establishment of these relationships with outside entities, as part of or outside the student's academic program at the University, raises issues concerning the open vs. proprietary nature of the work, the ownership of any intellectual property that may result, and possible conflicts of commitment and interest. No student may initiate a relationship, for research or other academic purposes, between the University and a private, government, or non-profit organization. Such arrangements MUST be made by the PI through the Office of Research and Technology. When conflict of interest or commitment do arise the ASTATE policy is designed to manage these in an open manner in order to protect both the researchers (students and faculty) and the university.

The University's Conflict of Interest and commitment policy may be found here: <http://www.astate.edu/dotAsset/8df7ead3-0ff6-45b2-b79a-3f3571b7c569.pdf> All University faculty, students and staff are required to comply with the provisions of this policy.

#### Conflict of Commitment:

Full-time University graduate students and faculty members owe their primary professional allegiance to the University, and their primary commitment of time and intellectual energies should be to the education, research and scholarship programs of the institution. The specific responsibilities and professional activities that constitute an appropriate and primary commitment will differ across departments within the MBS Program, but they should be based on a general understanding between the student, faculty member, their Department Chair, their College Dean, and the MBS Program Director.

#### Conflict of Interest:

A conflict of interest occurs when there is a divergence between an individual's private interests and his or her professional obligations to the University such that an independent observer might reasonably question whether the individual's professional actions or decisions are determined by considerations of personal gain, financial or otherwise. A conflict of interest depends on the situation, and not on the character or actions of the individual. At Arkansas State University, conflicts of interest can arise out of the fact that a mission of the University is to promote public good by fostering the transfer of knowledge gained through University research and scholarship to the private sector. Two important means of accomplishing this mission include faculty consulting and the commercialization of technologies derived from faculty and student research. It is appropriate that faculty and students be rewarded for their participation in these activities through consulting fees and sharing in royalties resulting from the commercialization of their work. It is wrong, however, for an individual's actions or decisions made in the course of his or her University



activities to be determined by considerations of personal financial gain. Such behavior calls into question the professional objectivity and ethics of the individual and it also reflects negatively on the University. Arkansas State University is an institution of public trust; faculty and students must respect that status and conduct their affairs in ways that will not compromise the integrity of the University. Graduate students and MBS faculty will conduct their affairs so as to avoid or minimize conflicts of interest, and must respond appropriately when conflicts of interest arise. If a situation raising questions of conflict of commitment or interest arises, faculty and students are urged to discuss the situation with the MBS Program Director, their Department Chair, College Dean, or the Associate Vice Chancellor for Research and Technology.

#### Policy on Allegations, Investigations and Reporting:

As its title indicates, the MBS policy on scientific misconduct focuses on problems that sometimes arise in the conduct of research in the sciences and engineering. However, its fundamental principles of honesty and conscientious observance of good research practices apply to scholarship across the University and to students as well as faculty and staff. These principles are articulated in the paragraphs below. Each member of the MBS community has a responsibility to foster an environment which promotes intellectual honesty and integrity, and which does not tolerate misconduct in any aspect of research or scholarly endeavor. Scientific misconduct is extremely troubling, in spite of its infrequency, because when it occurs, it is very destructive of the standards we attempt to instill in our students, of the esteem in which academic science in general is held by the public, and of the financial support of the government and other sponsors for academic scientific enterprise. The importance of integrity in research cannot be overemphasized.

#### **D. SCIENTIFIC MISCONDUCT**

“Scientific misconduct” is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those commonly accepted within the scientific community in proposing, performing, or reviewing research, or in reporting research results. It does not include honest error or honest differences in interpretations or judgments of data. Also included as “scientific misconduct” is retaliation of any kind against a person who, acting in good faith, reported or provided information about suspected or alleged misconduct. Allegations or suspicions of misconduct should be directed to the cognizant Dean of the College of Science and Mathematics, or the Vice Chancellor of Research for investigation, although the process of investigation and reporting obligations may differ from those required for scientific misconduct cases.

#### Determination of Discipline:

The determination as to whether discipline is to be imposed is governed by existing policies. In cases involving faculty, sanctions may only be imposed through the faculty disciplinary process. The MBS Program Director will refer cases of significant student misconduct to the Dean of the College of Sciences and Mathematics and to the vice provost of Research and Technology Transfer. Cases involving faculty or staff members will be referred to the appropriate administrator (i.e., Department Chair or College Dean).

#### **E. MBS GRADUATE STUDENT PUBLICATION/PRESENTATION POLICY**

Upon acceptance into the program, all Graduate Students in the Arkansas State University Molecular Biosciences Program automatically agree to abide by the policy that their advisor, with input by their PhD Advisory Committee, the MBS Program Committee and MBS Program Director will exercise purview and controlling interest over all data and scientific inquiry obtained or performed by said student, and all conclusions, ramifications, or benefits arising from such data or inquiry. The advisor will also exercise such overall purview and controlling interest on research or scholarship, dissemination, conference attendance, professional consulting or outside employment, and public appearances by the student in any role related at all to his/her participation in any capacity in the Molecular Biosciences Program. All MBS graduate students will sign an Intellectual Property Agreement within the first week of residence. Students may not pursue opportunities for dissemination or other professional or public activities without the full knowledge, agreement, and appropriate degree of participation by the advisor. Specifically, students will not independently pursue other secondary scholarly investigation, other than routine course activities, or dissemination over any topic with other faculty or students at the University or elsewhere without the

advisor's prior full approval and appropriate degree of participation. Conversely, advisors and other faculty will respect the student's contribution to the total research effort and grant the student appropriate credit, opportunities, and benefits for the contribution. All parties should always keep in mind that they are ambassadors for the program and examples for others and should always strive to abide by a high-level of scientific integrity and professionalism.

## SECTION VII. Molecular Biosciences Graduate Program Learning Outcomes

The M.S. /Ph.D. MBS degrees have three program-level student learning outcomes. They are as follows:

- **Program-Learning Outcome (PLO) 1 – Mastery of the Scientific Process:** Students will complete a well-organized scientific study related to molecular biosciences. This requires students to think critically, develop hypotheses, review the literature, design and perform experiments, analyze and interpret data (results), and write and defend a thesis/dissertation proposal.

*Assessment Method for PLO 1: CAT (Critical Thinking Assessment Test).* The MBS program has been using the CAT to assess critical thinking skills. This test was developed by faculty from various U.S. institutions and disciplines. It is supported with funding through the National Science Foundation. The test is comprised of 15 questions. The CAT has been given to all incoming (first semester) and outgoing (last semester) MBS M.S. and Ph.D. students since 2013.

*Benchmark:* The MBS program would like to see an improvement in the CAT scores among outgoing students. An improvement of 20% in the test scores for graduating students for all 15 questions is the benchmark.

- **Program-Learning Outcome (PLO) 2 – Expertise in Science Communication:** Students will develop expertise in oral and written communication skills.

*Assessment Method for PLO 2:*

1. **Rubric evaluating oral communication.** Students will improve in developing their oral communication skills throughout their tenure in the program. Evaluation of students' oral defenses of their thesis proposal and final thesis defense by their primary research advisors on the initial draft/presentation and by their committee members on their final draft and presentation will be made. This evaluation will take place at A-State where the student takes the exam (external committee members may perform the evaluation remotely attending the defenses through web/skype). The evaluation is based on a well-crafted rubric recommended by the A-State office of assessment and modified to suit program specific needs.

*Benchmark:* Students need to show an improvement in their oral skills from early stage (proposal) to late stage (final defense).

2. **Rubric evaluating written communication skills.** Students will improve in developing their written communication skills throughout their tenure in the program. Evaluation of students' thesis proposal and final thesis by their primary research advisors on the initial draft and by their committee members on their final draft will be made.

*Benchmark:* Students need to show an improvement in their written skills from early stage (proposal) to late stage (final thesis/dissertation).

- **Program-Learning Outcome (PLO) 3 – Advanced Knowledge of the Field** - Students will be able to demonstrate competency in the field of advanced cellular and molecular biology through course work, experimentation in the laboratory and ability to think critically about the biological processes as well their applications in their own research.

Assessment Method for PLO 3: Number of publications and presentations. M.S. /Ph.D. MBS student's research projects should lead to presenting their work in multiple forums. This includes presentations (oral & poster) at the local, state, regional, national and international levels. Students should also be contributing to their field of research by submitting and successfully publishing their work in peer-reviewed journals.

*Benchmark:* All students should be presenting their work at regional/state or national meetings during their tenure in the program. All M.S. /Ph.D. students should have at least one publication submitted or published before graduating from the program.

Our mission is to train the next generation of scientists with strong emphasis on interdisciplinary approaches, state-of-the-art technologies and innovation to engage in research in genomic, proteomic, cellular, and organ-based systems for the purpose of translating this knowledge into applications benefitting society in fields ranging from agriculture to medicine, from forensics to environmental impacts, from food sciences to renewable energy.

## SECTION VIII. Molecular Biosciences Course Offerings

### **MBS 6213 Advanced Cell Biology**

Study of recent advances in cell biology through critical analysis of current literature. Focusing on eukaryotic cell structure and function, topics may include, but not be restricted to, cellular structures and organelles; cell cycling; signal transduction; gene regulation; and intracellular trafficking Prerequisites: A course in cell biology or permission of professor

### **MBS 6233 Specialized Biochemistry**

An advanced study of biochemical pathways leading to specialized biologically active metabolites. Emphasis will be on the specialized pathways in plants and their counterparts in animals, and microorganisms. Prerequisites: CHEM 4243 or permission of instructor.

### **MBS 6243 Molecular Genetics and Genomics**

An advanced treatment of genetics in microbial, animal, and plant systems, focused on the biochemical and molecular aspects of genetics structure and function. Information derived from current and recent genomic analyses and genomic comparisons will be included. Prerequisite: CHEM 4243 or permission of instructor.

### **MBS 6251 Techniques in Molecular Biosciences**

Training in major technical and analytical skills required for contemporary molecular biosciences research. Topics, identified by subtitles, will vary by semester. May be repeated up to 2 credit hours with unduplicated subtitles.

**MBS 7111 Seminar in Molecular Biosciences (minimum of two semesters)**

Reports on and discussions of current topics in Molecular Biosciences, and other science topics.

Presentations and discussion by faculty and students. May be repeated. Prerequisites: Admission to the MBS MS program or permission of professor.

**MBS 7151 Responsible Conduct in Research**

A one credit hour course providing training on ethical behavior in sciences.

**MBS 7251 Mentored Teaching**

Structured instruction and practice of concepts and strategies of college teaching for graduate students in Molecular Biosciences. With this preparation, and sufficient topical background, Students will be prepared to teach A-State undergraduate level laboratory or lecture sections in subjects related to molecular biosciences.

**MBS 689V 1-6 Master's Thesis**

Can be taken after successfully defending the thesis research proposal. As graduate students performing research, the M.S. students in the MBS program are expected to propose a thesis topic, defend the research proposal, perform research, write, defend and submit a thesis on the research pertaining to Molecular Biosciences. Towards this goal, the students will spend a minimum of 6 credit hours working on their thesis.

**MBS Curriculum Courses Description:** The following curriculum courses (credit hours) have previously been approved by curriculum committees at the departmental, college, and university levels.

**MBS 6001 Fundamentals of Entrepreneurship for Scientists**

Entrepreneurship from discovery through protected intellectual property. Information about the fundamental processes required to protect new inventions. Including definitions of intellectual property, necessary record keeping, and disclosure options for protecting IP and patent application process.

**MBS 712V (1-3 hours) Topics in Molecular Biosciences**

In-Depth study of specific areas related to Molecular Biosciences. Topics of relevance and/or Multidisciplinary involving extensive discussion and critical analysis of current literature, group discussion. May be repeated as topic varies. Prerequisite: two MBS core classes or permission of instructor.

**MBS 6/713V (1-9 hours) Independent Research (Study) in Molecular Biosciences**

Independent investigation of a particular topic or technique, directed by faculty that culminates in the development of or training in new techniques or publishable discoveries. May be repeated as topic varies. Prerequisites: Open to all graduate students with consent of instructor.

Any additional coursework requirements will be determined by the Graduate Advisory Committee to meet the student's specific program needs. Each candidate for the Master of Science in Molecular Biosciences degree must execute an original research project culminating in the completion and defense of a thesis.

### Possible Elective Course Offerings

BIO 5103	Virology	3
BIO 5113/5111	Immunology and Lab	4
BIO 5123	Cell Signaling	3
BIO 5133/5131	Cell Biology and Lab	4
BIO 5143	Pharmacology	3
BIO 6023	Genetic Engineering	3
BIO 5363	Mammalian Neurobiology	3
BIO 5123/5211	Human Genetics and Lab	4
BIO 6543	Cell & Molecular Neurobiology	3
BIO 5611	Radiation Safety	1
BIO 5104	Microbiology	4
BIO 5001/5003	Lab Techniques in Microscopy and Lab	4
BIO 6003	Scientific Methods and Research Design	3
BIO 5683	Biological Data Analysis	3
STAT 5463	Probability and Statistics II	3
STAT 6643	Multivariate Analysis	3
MGMT 6443	Management Development Strategies	3
MGMT 6453	Seminar in Contemporary Management Issues	3
MGMT 6793	Business Ethics and Social Responsibility	3
MKTG 6223	Strategic Marketing	3

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